

February 28, 2019

Patrick McDonnell, Secretary
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By email

Re: Resubmission, Amendment and Supplement to Petition Pursuant to 25 Pa. Code §§ 23.1-23.5, Article I, §27 of the Pennsylvania Constitution, and the Pennsylvania Air Pollution Control Act to Adopt the Attached Regulation Establishing a Comprehensive Program to Limit Greenhouse Gas Emissions Through an Auction-Cap-and-Trade Program to Conserve and Maintain a Stable Climate and Other Public Resources for Which the Commonwealth is a Trustee.

Dear Secretary McDonnell and Ms. Edinger,

As indicated in our original November 27, 2018, submission of the above referenced Petition, we are hereby resubmitting and supplementing the above-referenced Petition by submitting (1) a revised Petition form, (2) a revised Exhibit A, reflecting additional petitioners who have added their names to our Petition after our initial November 27 submission, (3) the final published version of the article attached to the Petition as Exhibit C, Robert B. McKinstry, Jr. & John C. Dernbach, *Applying the Pennsylvania Environmental Rights Amendment Meaningfully to Climate Disruption*, 9 Mich. J. Env't'l & Admin. L 50 (2018), (4) this letter which contains additional information supporting the Petition, and (5) the proposed regulation, text of the Petition and original submittal letter, which are identical to what was submitted on November, 27 2018.

192 individuals and organizations now join in our Petition.¹ The petitioners include 33 religious and faith-based or affiliated organizations, 11 education institutions and organizations,² 22 environmental and health advocacy groups, 8 municipalities or municipal organizations, 7

¹ This number is greater than the number on the list because many organizational representatives have also joined in their individual capacity.

² Many petitioners fall into several categories, so that these numbers will not add up to the total given at the beginning.

community organizations, 26 businesses and business and investment organizations, and 97 individuals. The individuals include the officers and directors of these organizations and many respected professors and researchers, including Michael Mann, a world-renowned climate researcher and the recipient of the Nobel prize awarded to members of the IPCC, and Professor John Dernbach, who has been recognized by the Pennsylvania Supreme Court as the leading scholar of Article I, § 27 of the Pennsylvania Constitution.

The exigencies supporting the Commonwealth's adoption of a regulation reducing economy-wide greenhouse gas emissions to achieve neutrality by the middle of the century become more evident daily. Immediately before the submission of the Petition, the Intergovernmental Panel on Climate Change issued a report showing that, unless worldwide emissions are reduced by 40% from 2010 levels by 2030 and reach carbon neutrality by around 2050, severe adverse impacts on resources for which the Commonwealth is a trustee under Article I, § 27 of the Constitution will result. IPCC, Myles Allen et al, *Global Warming of 1.5 °C* (Oct. 6, 2018) ("IPCC 2018 Report"), www.IPCC%20-%20SR15.htm. Those findings were bolstered by another report issued by the U.S. Global Change Research Program immediately before the Petition's submission. The U.S. Global Change Research Program's *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States* (2018), available at <https://nca2018.globalchange.gov/>, concluding that without "substantial and sustained mitigation," the United States would suffer substantial damage to its natural resources and its economy. Additional developments and reports supporting the action requested by the Petition have continued.

We are, therefore, also supplementing our original submission with this letter outlining these many additional developments that weigh strongly in favor of the Board proceeding to adopt the proposed regulation to help avoid the worst consequences of the looming climate disruption emergency. These developments, over the three months since our Petition was submitted, include the following:

- On January 8, 2019, Governor Wolf issued Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Conservation and Sustainable Governance*. This Executive Order establishes the goals of achieving a 26% reduction in greenhouse gas ("GHG") emissions from 2005 levels by 2025 and an 80% reduction from 2005 levels by 2050. The Order establishes a Green Government Council and charges the Council to "encourage the incorporation of environmentally sustainable practices into the Commonwealth government's policy, planning, operations, procurement, and *regulatory* functions, and strive for continuous improvement in efficiency and performance to achieve the goals set forth above." (emphasis added). It further requires that Commonwealth agencies reduce their own emissions by 3% per year from 2017 levels, ordering that "all agencies shall: (1) Develop policies to incorporate the strategies outlined in this Order to achieve the Commonwealth's Performance Goals." The proposed regulation that is the subject of our Petition is a necessary "regulatory" prerequisite to achieving the Commonwealth's Performance Goals. As reflected in the blog by Professor Amy Sinden attached as Exhibit B, "The proposed cap-and-trade program provides the missing piece necessary to make the laudable goals set forth in the governor's executive order a reality." Amy Sinden, *Cap-and-Trade Could Fill Gaps in*

Governor Wolf's Climate Change Executive Order, JURIST – Academic Commentary, Jan. 30, 2019, <http://jurist.org/forum/2019/01/amy-sinden-cap-and-trade-could-fill-gaps-in-governor-wolfs-climate-change-executive-order/>.

- On December 18, 2018, Pennsylvania, 8 other states and the District of Columbia announced that they would participate in the Transportation and Climate Initiative to reduce greenhouse gas emissions from the transportation sector. *Transportation & Climate Initiative Statement* (December 18, 2018), https://www.georgetownclimate.org/files/Final_TCI-statement_20181218_formatted.pdf The policy mechanisms have not yet been developed. The proposed rule would provide a mechanism which could be a centerpiece of this initiative and allow linkage with the California-Quebec initiative. Deep decarbonization will ultimately require electrification of the transportation sector, while simultaneously decarbonizing the electricity sector. The policy mechanism utilized in the proposed regulation represents the only mechanism that can both create the proper market incentives for this transformation and be implemented without additional legislation.
- On November 29, 2018, the Pennsylvania Bipartisan Nuclear Caucus released a report showing the loss of the Commonwealth's nuclear industry would have severe adverse economic and environmental impacts on the Commonwealth. *Bicameral Nuclear Energy Caucus Report* (2017-2018 Session), <http://nuclearenergy.pasenategop.com/wp-content/uploads/sites/90/2018/11/Nuclear-Energy-Caucus-Report-November-2018.pdf>. The Report examined four policy alternatives (including a do nothing alternative) and identified “a market solution . . . putting a price on carbon” as “the long term solution.” Our proposed regulation would implement such a solution and could do so expeditiously if the Board acts expeditiously. Notably, the other two solutions involve modifying the AEPS to create subsidies paid by imposing charges on electricity users. Putting a price on electricity transmission and distribution will discourage the electrification necessary to achieve deep decarbonization, particularly where there is no price put on burning fossil fuels for transportation, industrial processes and building heating and cooling. To the extent that subsidies for nuclear and renewable energy generation, energy efficiency, or mechanisms such as carbon capture and sequestration are imposed under the AEPS, it would be better to pay those subsidies using funds from a uniform charge on GHG emissions such as would be created by our proposed regulation.
- The Environmental Law Institute released a booklet edited by Professors Michael B. Gerrard and John C. Dernbach identifying the top recommendations among the more than 1000 law and policy mechanisms available to achieve the deep decarbonization necessary to avoid the worst impacts of climate change. Michael B. Gerrard & John C. Dernbach, eds., *Legal Pathways to Deep Decarbonization in the United States: Summary & Key Recommendations* (ELI November 2018), https://www.eli.org/sites/default/files/docs/books/deep_decarb_summary_booklet_online.pdf. This booklet will be followed by a more complete volume that is still in publication. The booklet and the upcoming volume identify mechanisms in a variety of sectors. Notably the volume identifies carbon pricing not only as a leading cross-cutting mechanism, but most of the sectoral recommendations also include one or more

recommendations for both putting a price on greenhouse gas emissions and creating incentives for carbon sequestration, such as would be provided by opportunity for creating credits under the proposed rule. This comprehensive work supports our position that the policy mechanism that would be established by our proposed rule is a necessary element of a program to achieve the deep decarbonization necessary to avoid the worst impacts of climate disruption.

- A recently released study shows substantially increased concern among Americans regarding climate disruption and seventy percent say that the issue is either “extremely,” “very,” or “somewhat” important to them personally. A Leiserowitz *et al*, *Climate Change in the American Mind* (December 2018), <http://climatecommunication.yale.edu/wp-content/uploads/2019/01/Climate-Change-American-Mind-December-2018.pdf>.
- More than once a week since the November 27, 2018m submission of our Petition, a new scientific study or article has been published showing the very substantial impact of greenhouse gas pollution on trust resources or related interests. In many cases those impacts are additional to or more severe than those identified in the prior studies included in the Petition. These articles and studies underscore the need for action now. The studies that we have identified include the following:
 - A review article on recent research determined that climate disruption from greenhouse gas pollution would cause additional and more severe adverse impacts than those identified in EPA’s 2009 Endangerment Finding, P.B. Duffy *et al.*, *Strengthened scientific support for the Endangerment Finding for atmospheric greenhouse gases*, 19.1126/science.att5982 (December 13, 2019).
 - A review article in *Science* concluded that unusually warm water had contributed to disruption of marine food chains, adversely affecting important fisheries, such as cod fisheries and that continued warming could cause widespread disruption of marine ecosystems and fisheries. Warren Cornwall, *In Hot Water*, 363 *Science* 442 (Feb. 1, 2019).
 - A publication by ClimateWise reported modelling for the insurance industry showing substantial increased risk and cost from extreme climate events if temperature increases by 4°C rather than 2°C by the end of the century. Mark Westcott, John Ward, Swenja Surminski, Paul Sayers, & David Bresch, *Physical risk framework: Understanding the impacts of climate change on real estate lending and investment portfolios*, ClimateWise, University of Cambridge Institute for Sustainability Leadership (Feb. 2019), available at <https://www.cisl.cam.ac.uk/business-action/sustainable-finance/climatewise/transition-risk-report-request>.
 - A study reported that new modeling showed that when CO₂ levels rise above 1,200 ppm stratocumulus clouds break up, reducing their cooling effects. Tapio Schneider, Colleen M. Kaul & Kyle G. Pressel, *Possible climate transitions from*

breakup of stratocumulus decks under greenhouse warming, nature geoscience (Feb. 25, 2019), available at https://www.nature.com/articles/s41561-019-0310-1.epdf?referrer_access_token=3qNOjaHgavF0BUqfARxBzNRgN0jAjWel9jnR3ZoTv0Nq8LfnDsfOJgJee7VyE1P3Os66kts5LokuiMMwFm4UFkI2NwdJyxi_qBtoYuz2DtJ5gLBbM_nIUmMdv1D0JlcAuSv2ew_XUgig8MBt3VZwc9c2I4OM-vuvDGoJrQVCV-klWa_gQfbSmcG89rACttN79k0ZdWrgTLdNiAAfhLrE8EHyp1XuOYd6kygV10pprr1TXILQTI5WOErdj5qHpWDVDEGCySCDRv15vVkzCxOHZpDQOoifZbRzHMWd0sf6mN3pPTHQHqKt4bYVIS5iNs0z1fwl98GBze51kONN87T6M9ZkcTJw2mbudmdNUPg9WD5jtrHqRbmRvJFhe-HsMQii&tracking_referrer=www.washingtonpost.com. Some researchers who contend that warming and climate disruption will be less than predicted by the predominant models have relied upon their belief that increased cloudiness will reduce incoming solar radiation. This new modeling suggests that, at high levels of carbon dioxide, the opposite effect will occur.

- A study of the local impact of climate disruption on Annapolis Maryland showed increased flooding from climate disruption in 2017 already cost local businesses roughly 1 percent of annual revenue from lost customers, that three inches of sea level rise would double the number of customers lost and that one foot of rise would reduce customers by approximately 25%. Miyuki Hino, *et al.*, *High-tide flooding disrupts local economic activity*, 5 Sci. Adv.eaau2736 (Feb. 15, 2019) available at <http://advances.sciencemag.org/content/advances/5/2/eaau2736.full.pdf>.
- A research note released by Morgan Stanley concluded that climate disasters over the last three years had cost the world \$650 billion with North America bearing \$415 billion, 0.66 percent of North America’s GDP. Tom DiChristopher, *Climate disasters cost the world \$650 billion over 3 years — Americans are bearing the brunt: Morgan Stanley*, CNBC (Feb. 14, 2019), available at <https://www.cnbc.com/2019/02/14/climate-disasters-cost-650-billion-over-3-years-morgan-stanley.html>.
- A new study of black carbon in the arctic showed that most (61%+/-10%) of the black carbon arose from burning fossil fuel combustion rather than biomass (39 +/- 10%), such that reduction of fossil fuel use will reduce black carbon in the arctic and reduce its warming effect. P. Winiger *et al.*, *Source apportionment of circum-Arctic atmospheric black carbon from isotopes and modeling*, 5 Sci. Adv. eaau8052 (Feb. 13, 2019), available at <http://advances.sciencemag.org/content/advances/5/2/eaau8052.full.pdf>
- A study by top hurricane experts determined that hurricanes in the Atlantic Ocean have grown considerably worse as a result of global warming. The warming causes more rapid intensification which increases damage and complicates emergency response. Kieran T. Bhatia, et al., *Recent increases in tropical*

cyclone intensification rates, 10 *Nature Communications* 635 (Feb. 7, 2019), <https://www.nature.com/articles/s41467-019-08471-z>.

- The year 2018 saw 14 climate natural disasters (hurricanes, wildfires, a drought and severe storms) caused or exacerbated by climate change that each resulted in more than \$1 billion in damage. Phil McKenna, *Hurricane Michael Cost This Military Base About \$5 Billion, Just One of 2018's Weather Disasters*, Inside Climate News (Feb. 6, 2019), <https://insideclimatenews.org/news/18122018/tyndall-military-hurricane-cost-2018-year-review-billion-dollar-disasters-wildfire-extreme-weather-drought-michael-florence>.
- A new study showed that increases in temperature and rainfall would cause increased methane emissions from melting permafrost, creating a positive feedback loop that will increase climate disruption. Rebecca B. Neumann, *et al.*, *Warming Effects of Spring Rainfall Increase Methane Emissions From Thawing Permafrost*, Research Letter 10.1029/2018FLO81274, *Geophysical Research Letters* (Feb. 4, 2019), available at <https://agupubs.onlinelibrary.wiley.com/doi/epdf/10.1029/2018GL081274>.
- The annual assessment of worldwide threats to national security prepared by the Director of National Intelligence, released on January 29, 2019, concluded that climate disruption poses a risk to global stability because it is "likely to fuel competition for resources, economic distress, and social discontent through 2019 and beyond." "Climate hazards such as extreme weather, higher temperatures, droughts, floods, wildfires, storms, sea level rise, soil degradation, and acidifying oceans are intensifying, threatening infrastructure, health, and water and food security." The report further concluded that "Irreversible damage to ecosystems and habitats will undermine the economic benefits they provide, worsened by air, soil, water, and marine pollution." Daniel R. Coats, *Worldwide Threat Assessment of the US Intelligence Community* (Jan. 29, 2018), https://climateandsecurity.files.wordpress.com/2019/01/worldwide-threat-assessment_dni_2019.pdf.
- Several reports showed accelerating melting of glaciers. Philippus Wester, Arabinda Mishra, Aditi Mukherji, & Arun Bhakta Shrestha, eds. *The Hindu Kush Himalaya Assessment* (International Centre for Integrated Mountain Development 2019), <https://link.springer.com/content/pdf/10.1007%2F978-3-319-92288-1.pdf> (under a best case scenario, Himalayan mountains will lose more than one-third of their ice by 2100); M. Bevis *et al.* *Accelerating changes in ice mass within Greenland, and the ice sheet's sensitivity to atmospheric forcing*, *Proc. Nat'l Acad. Sci* (Jan. 22, 2019) <https://www.pnas.org/content/early/2019/01/14/1806562116/> E. Rignot *et al.* *Four decades of Antarctic Ice Sheet mass balance from 1979-2017*, *Proc. Nat'l Acad. Sci.* (Jan. 22, 2019), <https://www.pnas.org/content/116/4/1095>.; L.D. Trusel *et al.* *Nonlinear rise in Greenland runoff in response to post-industrial Arctic*

warming, 564 Nature 104 (December 2018), <https://www.nature.com/articles/s41586-018-0752-4>; P. Milillo, *et al.*, *Heterogeneous retreat and ice melt of Thwaites Glacier, West Antarctica*, *Sci. Adv* 1019, 5:eaau3433 (Jan. 30, 2019), <http://advances.sciencemag.org/content/advances/5/1/eaau3433.full.pdf>. This is likely to lead to increased sea level rise that will inundate parts of the Commonwealth, move the salt line in the Delaware River upriver and increase saltwater intrusion into groundwater.

- A report concluded that rates of permafrost warming were accelerating. That warming will release additional greenhouse gases in a positive feedback loop that will increase adverse impacts. B. K. Biskaborn *et al.*, *Permafrost is warming at a global scale*, 10 Nature communications 264 (January 2019).
- Studies were released showing that the oceans are warming more than previously estimated, contributing “to increases in rainfall intensity, rising sea levels, the destruction of coral reefs, declining ocean oxygen levels, and declines in ice sheets; glaciers; and ice caps in the polar regions.” L. Cheng *et al.*, *How fast are the oceans warming?*, 363 Science 128 (Jan. 11, 2019).
- In a report to Congress, the United States Department of Defense identified significant risks from climate change at 79 key military facilities. U.S. Dep’t of Defense, *Report on Effects of a Changing Climate to the Department of Defense* (January 2019), <https://www.documentcloud.org/documents/5689153-DoD-Final-Climate-Report.html>.
- The Government Accountability Office released a report to Congress indicating that climate change would lead to disruption from increased levels of global migration. GAO, *Climate Change: Activities of Selected Agencies to Address Potential Impact on Global Migration* (January 2019), <https://www.gao.gov/assets/700/696460.pdf>.
- Two new studies demonstrated that the so-called “global warming hiatus” touted by climate-change deniers, never happened. J.S. Risbey *et al.*, *A fluctuation in surface temperature in historical context: reassessment and retrospective on the evidence*, 2018 *Env’tl Res. Lett.* 13 123008 (Dec. 19, 2018), <https://iopscience.iop.org/article/10.1088/1748-9326/aaf342/pdf>; S. Lewandowsky *et al.*, *The ‘pause’ in global warming in historical context: (II). Comparing models to observations*, 13 *Env’tl Res. Lett.* 123007 (Dec. 19, 2018), <https://iopscience.iop.org/article/10.1088/1748-9326/aaf372/pdf>.
- A report including 17 peer-reviewed analyses of extreme weather events during 2017 concluded that they would not have happened without human-induced climate change. *Explaining Extreme Events in 2017 from a Climate Perspective*, *Bulletin of the American Meteorological Society* (Dec. 10, 2018), <https://www.ametsoc.org/ams/index.cfm/publications/bulletin-of-the-american->

[meteorological-society-bams/explaining-extreme-events-from-a-climate-perspective/](https://www.american-meteorological-society-bams.com/explaining-extreme-events-from-a-climate-perspective/).

- Reports of the impacts of climate disruption during 2018 revealed that the United States alone had suffered billions of dollars of adverse impacts. Phil McKenna, *Hurricane Michael Cost This Military Base About \$5 Billion, Just One of 2018's Weather Disasters: Major hurricanes, devastating wildfires, a drought and a series of extreme storms ran up the count of billion-dollar U.S. climate and weather disasters*, Inside Climate News (Dec. 18, 2018), <https://insideclimatenews.org/news/18122018/tyndall-military-hurricane-cost-2018-year-review-billion-dollar-disasters-wildfire-extreme-weather-drought-michael-florence>.
- A report by world health leaders concluded that climate change was already impairing health and health systems and that this could have an “overwhelming impact” impairing public health as temperatures increase. N. Watts *et al.*, *The 2018 report of the Lancet Countdown on health and climate change: shaping the health of nations for centuries to come*, 392 *The Lancet* 2479 (Dec. 8, 2018), [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(18\)32594-7/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(18)32594-7/fulltext).
- Further research was published that suggested that sudden increases in carbon dioxide levels caused the end-Permian extinction, the greatest mass extinction in the geologic record. Ying Cui, *Climate swings in extinction*, 10 *Nature Geoscience* 889 (November 30, 2018).
- A new study showed that temperature increases beyond 1.5°C could cause ocean warming having significant adverse impacts on cod fisheries. F.T. Dahlke *et al.*, *Northern cod species face spawning habitat losses if global warming exceeds 1.5°C*, 4 *Sci. Adv.* no. 11 (Nov. 28, 2018), <http://advances.sciencemag.org/content/4/11/eaas8821>.
- The United Nations Environment Programme released a report showing that the emissions reductions commitments pursuant to the Paris Agreement fall far short of what will be necessary to avoid the worst impacts of climate change and that emissions increases showed that the world was unlikely to achieve even those reductions. UNEP, *Emissions Gap Report 2018* (November 2018), http://wedocs.unep.org/bitstream/handle/20.500.11822/26895/EGR2018_FullReport_EN.pdf?sequence=1&isAllowed=y. This underscores the need for other actors, such as Pennsylvania and other states to take action such as that proposed in our Petition.

Therefore, the co-signers urge the Board to move quickly to propose and adopt the regulation that is the subject of our Petition consistent with the deadlines imposed by 25 Pa. Code Chapter 23.

Respectfully,

Robert B. McKinstry, Jr.
John C. Dernbach
Joseph Minott
Robert Routh
C. Baird Brown
Liz Robinson

cc: Jessica Shirley jesshirley@pa.gov
Robert A. Reiley rreiley@pa.gov
Cindy Dunn cindydunn@pa.gov
Petitioners (by separate email)

November 27, 2018

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By email

Re: Petition Pursuant to 25 Pa. Code §§ 23.1-23.5, Article I, §27 of the Pennsylvania Constitution, and the Pennsylvania Air Pollution Control Act to Adopt the Attached Regulation Establishing a Comprehensive Program to Limit Greenhouse Gas Emissions Though an Auction-Cap-and-Trade Program to Conserve and Maintain a Stable Climate and Other Public Resources for Which the Commonwealth is a Trustee.

Dear Secretary McDonnell and Ms. Edinger,

On behalf of Clean Air Council, the Widener University Commonwealth Law School Environmental Law and Sustainability Center, and the other Petitioners identified at Exhibit A to the Petition, we hereby submit the following Petition for Rulemaking to adopt the proposed regulation attached as Exhibit B to the Petition or an equally effective regulation.

Article I, Section 27 of the Pennsylvania Constitution provides: “The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania’s public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.” Section 4005 of the Pennsylvania Air Pollution Control Act (“APCA”) provides the Environmental Quality Board (“EQB” or “Board”) the power and imposes upon the Board the affirmative duty to “[a]dopt rules and regulations, for the prevention, control reduction and abatement of air pollution . . . which shall be applicable to all air contamination sources.” 35 P.S. § 4005. Those regulations may “establish . . . maximum quantities of air contaminants” from any air pollution source” and “prohibit or regulate the combustion of certain fuels.” *Id.* Greenhouse gases are regulated air pollutants within the meaning of the federal Clean Air Act and the PaAPCA. *Massachusetts v. Environmental Protection Agency*, 549 U.S. 497 (2007); *Coalition for Responsible Regulation*,

Inc. v. EPA, 684 F.3d 102 (D.C. Cir. 2012), *see also Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014); *Funk v. Wolf*, 144 A.3d 228, 250 n. 17 (Pa. Cmwlth. 2016), *aff'd without opinion* 158 A.3d 642 (Pa. 2017). Pollution caused by excessive levels of these contaminants poses an existential threat the Pennsylvania's climate and other public natural resources for which the Commonwealth, including the Board, have a duty, as trustees, to maintain and conserve.

For the reasons set forth in this Petition and its Exhibits, we urge the Board to accept the attached regulation establishing an economy-wide auction-cap-and-trade program for Pennsylvania, with measures to prevent leakage and auction most allowances with a reserve price. Excess allowances will be retired and the cap will be reduced to zero by the fifth decade of this century, consistent with the requirements of the United Nations Framework Convention on Climate Change, as defined in the Paris Agreement.

The proposed regulation will require the degree of greenhouse gas emissions reductions on a schedule that will achieve the reductions that the most recent report of the Intergovernmental Panel on Climate Change has determined will be necessary throughout the world to avoid the worst impacts of climate disruption. The emissions reductions and the schedule are necessary to assure the beneficiaries of the constitutional environmental trust established by Article I, §27 of the Pennsylvania Constitution that the corpus of the trust will be conserved and maintained and that the beneficiaries and the Commonwealth will recover income from the sustainable husbanding of the remaining capacity of the atmosphere to absorb greenhouse gases.

For the benefit of the Board, we have also attached a Fact Sheet that provides a more abbreviated summary of the regulation than is provided in the Overview portion of the Petition.

Respectfully,

Robert B. McKinstry, Jr.
John C. Dernbach
Joseph Minott
Robert Routh
C. Baird Brown

cc: Jessica Shirley jesshirley@pa.gov
Robert A. Reiley reiley@pa.gov
Petitioners

EQB Climate Petition: Pennsylvania Cap-and-Trade Fact Sheet

- Article I, Section 27 of the Pennsylvania Constitution provides: “The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania’s public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.” This requires the Commonwealth to control greenhouse gas (“GHG”) emissions, which pose a threat to human health and the environment and to limit such emissions to the extent consistent with the social cost of carbon.
- Section 4005 of the APCA grants EQB the power, and imposes the duty, to “[a]dopt rules and regulations, for the prevention, control, reduction and abatement of air pollution . . . which shall be applicable to all air contamination sources” and to “[e]stablish and publish maximum quantities of air contaminants.”
- The proposed regulation will establish a Pennsylvania program where emissions from covered sources of GHG emissions would be capped, with the cap declining each year by an amount equal to 3% of the 2016 emissions, beginning in 2018. This would put Pennsylvania on track to achieve carbon neutrality by 2052, consistent with the goal established by the United Nations Framework Convention on Climate Change, as defined in the Paris Agreement. Under the proposed regulation:
 - o DEP would auction or distribute allowances equal to the cap, with each allowance equal to one metric ton of CO₂e, as determined under the EPA’s Mandatory Greenhouse Gas Reporting Rule (MRR). Sources required to report their emissions under the MRR, or otherwise required to report direct emissions, must annually surrender a number of allowances equal to their total annual GHG emissions (in CO₂e).
 - o Fossil fuel distributors (petroleum fuel products, natural gas, propane and natural gas liquids used for fuel, and coal) must annually surrender a number of allowances equal to the total annual GHG emissions (in CO₂e) released into the ambient atmosphere from combustion of the fuels.
 - o Fossil fuels sold to entities required to surrender allowances based on their GHG emissions will be exempt from the requirement for the surrender of allowances. Sales of fossil fuels to manufacture products that will not release GHGs, such as plastics, will be exempt from the requirement for the surrender of allowances. Biogenic CO₂ and geologically sequestered CO₂ will also be exempt.
 - o Most allowances will be distributed by auction, subject to a reserve price equal to \$10 in 2020, increasing by 10% per year plus inflation, or any higher reserve price in a program linked to the Pennsylvania program. Auctions occur periodically. Unsold allowances will be offered for sale at the next auction, put into a price containment reserve or retired.
 - o Industries with products (excluding fossil fuel and electricity generation) subject to international and interstate competition may apply for distribution of some allowances free of charge, by showing that this is necessary to prevent “leakage,” which might result if production were moved to other states or nations that do not put a price on GHG emissions. The number of free allowances will be reduced by 5% annually. If a company closes or reduces production, its free allowances will be reduced proportionately. DEP will be entitled to distribute free allowances to new businesses subject to international or interstate competition from any unsold allowances or the containment reserve in order to assure that this program does not discourage new business formation. Allowances may be bought by any person and may be freely traded. Allowances may also be banked for future use.

COMMONWEALTH OF PENNSYLVANIA
ENVIRONMENTAL QUALITY BOARD

PETITION FORM

I. PETITIONER INFORMATION

Name: Robert B. McKinstry, Jr., Clean Air Council, John C. Dernbach, C. Baird Brown and others on Exhibit A to the attached Petition. Others will be joining in the future and Exhibit A will be supplemented.

Mailing Address: See Exhibit A to the attached Petition.

Telephone Number: See Exhibit A to the attached Petition.

Date: February 28, 2019, resubmitting and supplementing November 27, 2018 submission

II. PETITION INFORMATION

A. The petitioner requests the Environmental Quality Board to (check one of the following):

- Adopt a regulation
- Amend a regulation (Citation_)
- Repeal a regulation (Citation_)

Please attach suggested regulatory language if request is to adopt or amend a regulation.

B. Why is the petitioner requesting this action from the Board? (Describe problems encountered under current regulations and the changes being recommended to address the problems. State factual and legal contentions and include supporting documentation that establishes a clear justification for the requested action.)

See the reasons set forth in the introduction and sections I, II, and III and Exhibit C to the attached longer Petition and the cover letter resubmitting and supplementing the Petition.

C. Describe the types of persons, businesses and organizations likely to be impacted by this proposal.

See Section IV of the attached Petition.

D. Does the action requested in the petition concern a matter currently in litigation? If yes, please explain.

No.

E. For stream redesignation petitions, the following information must be included for the petition to be considered complete. Attach supporting material as necessary.

1. A clear delineation of the watershed or stream segment to be redesignated, both in narrative form and on a map.
2. The current designated use(s) of the watershed or segment.
3. The requested designated use(s) of the watershed or segment.
4. Available technical data on instream conditions for the following: water chemistry, the aquatic community (benthic macroinvertebrates and/or fishes), or instream habitat. If such data are not included, provide a description of the data sources investigated.
5. A description of existing and proposed point and nonpoint source discharges and their impact on water quality and/or the aquatic community. The names, locations, and permit numbers of point source discharges and a description of the types and locations of nonpoint source discharges should be listed.
6. Information regarding any of the qualifiers for designation as high quality waters (HQ) or exceptional value waters (EV) in §93.4b (relating to qualifying as High Quality or Exceptional Value waters) used as a basis for the requested designation.
7. A general description of land use and development patterns in the watershed. Examples include the amount or percentage of public lands (including ownership) and the amount or percentage of various land use types (such as residential, commercial, industrial, agricultural and the like).
8. The names of all municipalities through which the watershed or segment flows, including an official contact name and address.
9. Locational information relevant to items 4-8 (except for contact names and addresses) displayed on a map or maps, if possible.

**All petitions should be submitted to the
Secretary of the Department of Environmental Protection
P.O. Box 2063
Harrisburg, PA 17105-2063**

BEFORE THE PENNSYLVANIA ENVIRONMENTAL HEARING BOARD

PETITION PURSUANT TO 25 PA. CODE §§23.1-23.5, ARTICLE I, §27 OF THE PENNSYLVANIA CONSTITUTION, AND THE PENNSYLVANIA AIR POLLUTION CONTROL ACT TO ADOPT THE ATTACHED REGULATION ESTABLISHING A COMPREHENSIVE PROGRAM TO LIMIT GREENHOUSE GAS EMISSIONS TO CONSERVE AND MAINTAIN A STABLE CLIMATE AND OTHER PUBLIC RESOURCES FOR WHICH THE COMMONWEALTH IS A TRUSTEE

Submitted on Behalf of Clean Air Council, Widener University Commonwealth Law School Environmental Law and Sustainability Center, and the Other Petitioners Identified on Exhibit A

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Dated: November 27, 2018 and February 28, 2019

PETITION PURSUANT TO 25 PA. CODE §§ 23.1-23.5, ARTICLE I, §27 OF THE PENNSYLVANIA CONSTITUTION, AND THE PENNSYLVANIA AIR POLLUTION CONTROL ACT TO ADOPT THE ATTACHED REGULATION ESTABLISHING A COMPREHENSIVE PROGRAM TO LIMIT GREENHOUSE GAS EMISSIONS THROUGH AN AUCTION-CAP-AND-TRADE PROGRAM TO CONSERVE AND MAINTAIN A STABLE CLIMATE AND OTHER PUBLIC RESOURCES FOR WHICH THE COMMONWEALTH IS A TRUSTEE

Pursuant to the Pennsylvania State Constitution Article I, § 20 “[t]he citizens have a right in a peaceable manner to assemble together for their common good, and to apply to those invested with the powers of government for redress of grievances or other proper purposes by petition...” The Environmental Quality Board (“Board” or “EQB”) has promulgated regulations governing the manner and means that the citizens may exercise that right to request the promulgation of a regulation within the Board’s authority at 25 Pa. Code Chapter 23. The Petitioners identified on Exhibit A³ hereby submit this petition for rulemaking on behalf of themselves, the citizens of the Commonwealth of Pennsylvania, and present and future generations to adopt the attached proposed regulation, which has been designed to limit Pennsylvania’s contribution to greenhouse gas pollution and to achieve climate neutrality by the second half of the 21st Century. The Petition seeks the adoption of the proposed regulation attached as Exhibit B.

This Petition conforms to the rules for petitioning the Board under Pennsylvania Code § 23.1 and is attached to the form for petitioning supplied by the Pennsylvania Department of Environmental Protection (“Department” or “DEP”). 25 Pa. Code § 23.1(a). Exhibit A to this Petition sets forth petitioners’ names, addresses, and telephone numbers. Pa. Code § 23.1(a)(1). Section I of this Petition set forth a clear description of the action requested and suggested regulatory language is set forth in a draft regulation attached hereto as Exhibit B. 25 Pa. Code § 23.1(a)(2)(i). Section II this Petition sets forth the facts that mandate the Board’s action adopting the proposed regulations. 25 Pa. Code §23.1(a)(3). Section III of this Petition and the article incorporated by reference in Section III set forth both the legal authorization to adopt it and the Constitutional mandate requiring its adoption. 25 Pa. Code § 23.1(a)(3). Finally, Section IV describes the impacts of the proposed regulation, including the types of persons, businesses and organizations that will be affected. 25 Pa. Code 23.1(a)(4).

³ A large number of additional parties have expressed an interest in becoming petitioners, so that Exhibit A will be supplemented in the future.

I. Overview of the Proposed Rule

The Petitioners identified on Exhibit A respectfully request that the Pennsylvania Environmental Quality Board (“EQB” or “Board”) propose and promulgate a regulation limiting emissions of greenhouse gases (“GHGs” expressed as CO₂e) to prevent climate disruption substantially in the form of the proposed 25 Pa. Code Chapter 147 attached hereto as Exhibit B. The proposed Chapter 147 would establish a program in which GHG emissions would be capped, with the cap declining each year. The budget is based on an initial budget for calendar year 2018 set at 97% of the 2016 GHG emissions. The cap then declines annually by an amount equal to three percent of the 2016 base emissions. Thus, if the regulation becomes effective for 2020, the cap would be equal to 91% of 2016 emissions. This will put Pennsylvania on a track to achieve the reductions that the latest report of the Intergovernmental Panel on Climate Change (“IPCC”) concludes will be necessary to avoid the worst impacts of climate disruption,⁴ thereby achieving the goal of the United Nations Framework Convention on Climate Change (“UNFCCC”), as defined in the Paris Agreement. The budget for 2030 will be 45% below 2010 emissions and will achieve emissions neutrality by 2052.⁵ The emissions reductions contemplated by the proposed Chapter 147 are also consistent with the scientific consensus of the reductions from developed nations that will be necessary to prevent disruption of the climate system and to conserve and maintain Pennsylvania’s climate and other public natural resources within the meaning of Article I, §27 of the Pennsylvania Constitution. The proposed Chapter 147 is both authorized and required by the Pennsylvania Air Pollution Control Act, 35 P.S. §§4001-4106, as described further in Section III and the article attached Exhibit C to this Petition and incorporated herein.

Under the proposed regulation, the Pennsylvania Department of Environmental Protection (“DEP” or the “Department”) would annually auction or distribute a number of allowances equal to the cap, with each allowance equal to one metric ton of CO₂e, as defined and determined under the Environmental Protection Agency’s Mandatory Greenhouse Gas Reporting Rule (“MRR”), 40 C.F.R. pt. 98 (2017), as it is incorporated in and modified by the proposed regulation. Three categories of potential emissions sources will be required to surrender allowances. First, sources that are required to report their direct emissions under the MRR will be required annually to surrender a number of allowances equal to their total annual GHG emissions (in CO₂e) attributable to Pennsylvania sources. Second, distributors of fossil fuels (petroleum fuel and petroleum fuel products, natural gas, propane and natural gas liquids used for fuel, and coal) in Pennsylvania will be required annually to surrender a number of allowances equal to the total annual GHG emissions (in CO₂e) that will be released into the ambient atmosphere from combustion of the fuels they distribute in Pennsylvania. Third, importers of electricity generated with fossil fuels that are not subject to an equivalent program will be required to surrender allowances equal to the emissions resulting from the generation of that

⁴ IPCC, Myles Allen et al, Global Warming of 1.5 °C (Oct. 6, 2018) (“*IPCC 2018 Report*”), www.IPCC%20-%20SR15.htm at SPM-19.

⁵ According to the 2018 EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2016, <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>, 2016 U.S. GHG emissions were 5.9% lower than 2010 emissions. Under the proposed rule, the emissions cap for 2030 will be 61% of 2016 emissions, represented approximately a 45% reduction from 2010, consistent with what the IPCC report indicates will be necessary.

electricity; this requirement can be satisfied by a carbon adder program administered by PJM, if PJM should adopt such a program. As discussed below, the PaAPCA authorizes regulations limiting both direct emissions from facilities and fuels and the proposed regulation is consistent with that authorization.

Sales of fossil fuels to entities required to surrender allowances based on their direct GHG emissions will be exempt from the requirement for the surrender of allowances. Likewise, sales of coal, petroleum and natural gas products for the purpose of the manufacturing products that will not release GHGs, such as plastics, will be exempt from the requirement for the surrender of allowances. Imported electricity from states with requirements similar to those imposed by Pennsylvania or subject to a carbon adder program that imposes an equivalent cost on the imported sources' GHG emissions will also be exempt from the program. No allowances need to be surrendered for biogenic CO_{2e} and geologically sequestered CO_{2e}.

Compliance periods will coincide with the compliance periods for the California-Quebec-Ontario program. The proposed regulation would, therefore, in most cases, establish a three-year compliance period, with one-year interim compliance periods. Covered sources would be required to surrender allowances equal to at least 30% of their GHG emissions every year with a true-up at the end of three years, when the covered entity must assure that it has surrendered allowances equal to all (100%) GHG emissions during the three-year period. To coordinate compliance periods with the California-Quebec-Ontario program (and to allow maximum trading opportunities), the first compliance period will begin on the effective date of the regulation and end on December 31 of the year that is consistent with the end of the next compliance period that is at least two years and no more than four years after the effective date of the proposed regulation.

Most allowances will be distributed by auction in which any person may bid and purchase allowances. The proposed regulation is generally consistent with the California economy-wide GHG auction-cap-and-trade regulation, which governs the regulatory program currently in force in California, Quebec, and Ontario. Thus, the mechanisms proposed, including the technical provisions for the auction, registration and trading are already functioning, will already be familiar to many of the affected industries so that the program can be readily implemented, and will provide for a broad market and high liquidity for allowances. The auction will be subject to a reserve price that is designed to provide consistency with other GHG cap-and-trade programs. It is initially set at \$10.00 per ton in 2020, increasing by 10% plus the rate of inflation thereafter. This will keep initial allowance prices below the RGGI cost for triggering the release of allowances from its cost containment reserve until 2024. If the Pennsylvania program becomes linked to any other program with a higher reserve price (i.e. the California program), the reserve price will increase to that program's reserve price. If any allowances are unsold in advance auctions for future years, the remaining allowances will be auctioned in future years. If allowances are unsold in an auction for the current vintage year, up to 25% will be offered at sale in the next auction (subject to the applicable reserve price) and any allowances that are unsold for more than two years will be retired or placed in an allowance price containment reserve. Allowances in the containment reserve will be released for auction only when the price exceeds the containment trigger, which was \$40 in 2013, increased by 5% annually plus the rate of inflation. The number of allowances in the price containment reserve

will be limited to $\frac{1}{4}$ of the then applicable cap and unsold allowances exceeding that maximum will be permanently retired.

For industries producing products subject to international and interstate competition (excluding fossil fuel distribution and electricity generation), some allowances will initially be distributed free of charge to prevent “leakage” that might result if production were moved to other states or nations that do not put a price on GHG emissions. The proposed regulation includes a mechanism for companies to apply to DEP for direct allocation of allowances, which may be distributed without charge or at a lower charge to the extent necessary to prevent leakage. This provision also includes a mechanism to protect companies that have already reduced emissions, by awarding them an equal number of allowances per unit of production as their competitors who have not taken early action (if the competitor receives a direct allocation). The number of free allowances directly awarded would initially be based on a company’s GHG emissions reported in 2018 and its level of production in that year and would be reduced by 5% of that initial baseline amount annually. Thus, all free allowances will be eliminated after 20 years. If a company closes its operations in Pennsylvania, it will lose the right to receive direct allowances. Likewise, if it moves any portion of its production out of the Commonwealth or otherwise reduces production, the number of direct allowances it receives will be reduced proportionately. DEP will be entitled to distribute free allowances to new businesses subject to international or interstate competition from any unsold allowances or the price containment reserve to assure that this cap-and-trade program does not discourage new business formation.

Allowances may be freely traded. Allowances may also be banked for future use. The regulatory program is being designed to allow interstate and international trading with any program that DEP determines is equivalent to the Pennsylvania program and which allows use of Pennsylvania allowances. The program is currently designed to be equivalent to the California-Quebec-Ontario program. Although the Regional Greenhouse Gas Initiative (“RGGI”) Program and the proposed Virginia cap-and-trade program are limited to larger electricity generation units, it will be important to allow trading with those programs to prevent leakage. The proposed regulation therefore provides that, with the exception noted below, if any of those programs agrees to accept Pennsylvania allowances, allowances may be freely traded with those programs. To assure that the program does not unduly disrupt electricity markets, the regulation provides that allowances from programs applying to electricity generating units in the PJM market, *i.e.* RGGI and Virginia, may be accepted for compliance with the Pennsylvania program and retired through the first full compliance period (3 to 5 years). This will cause allowance prices in those programs to rise and protect the export of low-emissions Pennsylvania electricity to those programs without the need for the states to negotiate, in advance, the terms under which RGGI and Virginia would accept Pennsylvania allowances. We anticipate that eventually the Pennsylvania program will be linked to all other cap-and-trade programs. Active markets and futures markets have already developed for allowances in the other existing programs, increasing liquidity and price discovery, and thus improving predictability for industry and industrial development.

The provision for trading with RGGI states, Virginia and the California-Ontario-Quebec program should limit leakage to those states. However, additional measures will need to be employed to limit leakage in the electric generation sector to states in PJM that do not put a price

on GHG emissions. The regulation includes provisions requiring imported electricity to obtain and surrender allowances equal to the emissions generated during the electricity generation. PJM has mechanisms (i.e. the GATS system) to measure environmental attributes that can be employed to implement that requirement. It has also developed, but has not implemented, a potential two-stage mechanism for establishing a carbon adder that would prevent such leakage between regulated and unregulated zones. The proposed regulation's requirement for the surrender of allowances for imported electricity would be satisfied if a carbon adder were imposed on electricity by PJM, to be implemented upon FERC's approval of a modification to PJM's tariff. We anticipate that New Jersey, Delaware, Maryland, Virginia and the District of Columbia would join with Pennsylvania to request that PJM implement its carbon adder to prevent leakage and that if they do so, PJM will be willing to implement the program, subject to FERC approval.

The proposed regulation will also allow the creation of offset credits for projects involving the sequestration of GHGs or reduction of GHGs from activities that are not required to surrender allowances. An offset must represent a GHG emission reduction or GHG removal enhancement that is real, additional, quantifiable, permanent, verifiable, and enforceable and be consistent with a compliance offset protocol. The proposed regulation incorporates offset protocols approved by California for ozone depleting substances projects, livestock projects, sustainable forestry projects and mine methane capture projects, as well as applicable RGGI offset protocols. The proposed regulation requires that DEP develop a protocol and provide credit for emissions reduction resulting from abandoned minelands reclamation, including control of mine fires and fires in culm and gob piles. It further requires DEP to develop a protocol for offsets for carbon capture and sequestration of emissions from combustion of biomass. DEP may develop and approve additional protocols in the future.

The proposed regulation includes provisions for administering auctions and for creating allowance accounts. It also includes provisions governing reporting and procedures for the surrender of allowances. If a party fails to submit an adequate number of allowances by the deadline, that party will be required to surrender four times the number of allowances that it did not timely submit. Failure timely to surrender an adequate number of allowances or non-compliance with any of the provisions of the regulation will also be subject to enforcement action under the APCA.

The proposed regulation includes provisions authorizing municipalities that administer their own air quality programs, currently Philadelphia and Allegheny Counties, to apply to administer this greenhouse gas auction-cap-and-trade program. If these jurisdictions undertake this program and wish to do so, they would be entitled to auction allowances for sources within their jurisdiction or participate in the larger Pennsylvania auction and receive their share of auction revenues. These jurisdictions may adopt their own allowance allocation rules and apply revenues as their governing bodies direct. The regulation, would, however, prohibit or limit the award of free allowances to electricity generators. This restriction is necessary to prevent perverse results.

II. Statement of Facts Constituting the Reasons the Board is Constitutionally Required to Adopt the Proposed Regulation Under Article I, § 27 of the Pennsylvania Constitution.

The following facts constitute the reasons that reduction of greenhouse gases emissions in Pennsylvania consistent with the recommendations of the Intergovernmental Panel on Climate Change the *IPCC 2018 Report* is necessary to conserve Pennsylvania's public natural resources within the meaning of Article I, § 27 of the Pennsylvania Constitution. The proposed regulation attached as Exhibit B would do so. As described in Section III, the facts set forth in this section create a constitutional mandate for this Board, as a trustee, to take action to conserve Pennsylvania's natural resource,s from the damages caused by greenhouse gas pollution consistent with its authorization and existing law provides the Board with the authority to do so by adopting the regulation attached to this Petition as Exhibit B.

1. According to the United States Global Change Research Program⁶, disruption of the global climate due to global warming is occurring and adversely impacting the Earth's climate.⁷ The present rate of global heating is occurring as a result of human activities that release heat-trapping greenhouse gases ("GHGs") and intensify the Earth's natural greenhouse effect, at an accelerated rate, thereby disrupting Earth's climate.⁸ This abnormal climate change is unequivocally human-induced,⁹ is occurring now, and will continue to occur unless drastic measures are taken to curtail it¹⁰. Climate change is damaging both natural and human systems, and if unrestrained, will alter the planet's

⁶ "The U.S. Global Change Research Program (USGCRP) coordinates and integrates federal research on changes in the environment and their implications for society." The organization's vision is to produce "[a] nation, globally engaged and guided by science, meeting the challenges of climate and global change." The organization is comprised of "[t]hirteen departments and agencies [that] participate in the USGCRP...steered by the Subcommittee on Global Change Research under the Committee on Environment and Natural Resources, overseen by the Executive Office of the President, and facilitated by an Integration and Coordination Office." <http://www.globalchange.gov/about>.

⁷ UNITED STATES GLOBAL CHANGE RESEARCH PROGRAM (USGCRP), GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES 13 (2009) available at <http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf> [hereinafter *Global Climate Change Impacts*] ("Human activities have led to large increases in heat-trapping gases over the past century. Global average temperature and sea level have increased, and precipitation patterns have changed.").

⁸ *Id.* ("The global warming of the past 50 years is due primarily to human-induced increases in heat-trapping gases."); DEUTSCHE BANK GROUP CLIMATE CHANGE ADVISORS, CLIMATE CHANGE: ADDRESSING THE MAJOR SKEPTIC ARGUMENTS 9 (September 2010) available at <http://www.dbcca.com/dbcca/EN/media/DBCCAColumbiaSkepticPaper090710.pdf>; Intergovernmental Panel on Climate Change (IPCC), *IPCC Fourth Assessment Report: Climate Change 2007 (AR4)*, 1.1 (2007) available at http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html#1-1.

⁹ USGCRP, *Global Climate Change Impacts* at 12 (2009).

¹⁰ *Id.* ("Future climate change and its impacts depend on choices made today."); IPCC, *AR4* 1.1 (2007) ("Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.").

habitability.¹¹

2. In December 2009, the United States Environmental Protection Agency (“EPA”) made an Endangerment Finding under the federal Clean Air Act.¹² The Administrator concluded that “the body of scientific evidence compellingly supports” the finding “that greenhouse gases in the atmosphere may reasonably be anticipated both to endanger public health and to endanger public welfare.” The primary scientific bases for the finding were the “major assessments by the U.S. Global Climate Research Program (USGCRP), the Intergovernmental Panel on Climate Change (IPCC), and the National Research Council (NRC).” “The Administrator reached her determination by considering both observed and projected effects of greenhouse gases in the atmosphere, their effect on climate, and the public health and welfare risks and impacts associated with such climate change.” The finding was affirmed on judicial review.¹³ As a result of the finding, EPA established emissions standards for mobile sources and GHGs became “regulated pollutants” under the Clean Air Act that must be regulated for new and modified major sources of air pollution.¹⁴ EPA has also established GHG standards for new and existing electric generating units under section 111 of the Clean Air Act, although the standards have been stayed and EPA has proposed to withdraw the standards for existing electric generating units, known as the Clean Power Plan and to replace those standards with weaker standards.¹⁵
3. Multiple reports of the U.S. Global Change Research Program, including its 2017 report;¹⁶ multiple reports of the National Research Council (“NRC”) of Academy of Natural

¹¹ USGCRP, *Global Climate Change Impacts* at 12 (2009) (“Thresholds will be crossed, leading to large changes in climate and ecosystems.”).

¹² “Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule,” 74 Fed. Reg. 66,496, 66,514 (Dec. 15, 2009) (“Endangerment Finding”), *aff’d* *Coal. for Responsible Regulation, Inc. v. U.S. Envtl. Prot. Agency*, 684 F.3d 102 (D.C. Cir. 2012) (“CRRP”), *aff’d in part and rev’d in part on other grounds sub nom. Utility Air Regulatory Group v. EPA*, 134 S. Ct. 2427 (2014) (“UARG”).

¹³ *CRRI, supra*.

¹⁴ *UARG, supra*.

¹⁵ Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Final Rule, 80 Fed. Reg. 64,661 (Oct. 23, 2015) (codified at 40 C.F.R. Part 60). *See also, Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units; Proposed Rule*, 82 Fed. Reg. 48,035 (Oct. 16, 2017).

¹⁶ U.S. GLOBAL CHANGE RESEARCH PROGRAM, CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I (2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf. *See also* John C. Dernbach & Robert Altenburg, *Evolution of U.S. Climate Policy*, in GLOBAL CLIMATE CHANGE AND U.S. LAW 84-87 (Michael B. Gerrard & Jody Freeman eds. 2014) (explaining authorizing legislation for U.S. Global Change Research Program and describing some earlier reports).

Sciences,¹⁷ the reports of the Intergovernmental Panel on Climate Change,¹⁸ numerous reports of other national academies of natural science,¹⁹ and even judicial decisions²⁰ have all concluded that emissions of GHGs from human activities are disrupting the climate, that adverse effects already occurring and these effects will get significantly worse without achieving net carbon neutrality. They further conclude that catastrophic impacts are possible.

4. We human beings have benefited from living on a planet that has been remarkably hospitable to our existence and provided conditions that are just right for human life to expand and flourish.²¹ The Earth is a “Goldilocks” planet with an atmosphere that has fewer GHGs than that of Venus (which is too hot), and more than that of Mars (which is too cold), which is just perfect for the life that has developed on planet Earth.²²
5. GHGs in the atmosphere trap a portion of the heat that the earth receives from the sun by reflecting infrared radiation back rather than allowing it to escape the atmosphere.²³ More GHGs in the atmosphere means that more heat is being retained on Earth, with less heat radiating back out into space.²⁴ Without this greenhouse effect, the average surface temperature of our planet would be 0°F (-18°C) instead of 59°F (15°C).²⁵ Scientists have understood this basic mechanism of global warming since the late-nineteenth century.²⁶
6. Human beings have significantly altered the chemical composition of the Earth’s atmosphere and its climate system.²⁷ We have changed the atmosphere and Earth’s

¹⁷ NRC, *America’s climate choices: Advancing the Science of Climate Change* (2010), available at <http://www.ipcc.ch/report/ar5/wg1/>; NRC, *Climate stabilization targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (2011), available at <https://www.nap.edu/catalog/12877/climate-stabilization-targets-emissions-concentrations-and-impacts-over-decades-to>; NRC, *Abrupt impacts of climate change: Anticipating Surprises* (2013), available at <https://www.nap.edu/catalog/18373/abrupt-impacts-of-climate-change-anticipating-surprises>.

¹⁸ IPCC, *Fifth Assessment Report (AR5)* (2014), available at <http://www.ipcc.ch/report/ar5/index.shtml>.

¹⁹ See, e.g. Royal Society, *Climate Change: A Summary of the Science* (2010), available at <https://royalsociety.org/topics-policy/publications/2010/climate-change-summary-science/>.

²⁰ See, *CRRI, supra*, n. 33 *Green Mt. Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 295 (D. Vt. 2007).

²¹ John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in *CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN* 11, 15-22 (Joseph F. C. DiMento & Pamela Doughman eds., MIT Press 2007) (“The earth’s climate system can be thought of as an elaborate balancing act of energy, water, and chemistry involving the atmosphere, oceans, ice masses, biosphere, and land surface.”).

²² JAMES HANSEN, *STORMS OF MY GRANDCHILDREN* 224-225 (2009); See John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in *CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN* at 23.

²³ John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in *CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN* at 22.

²⁴ *Id.* at 16-17.

²⁵ *Id.* at 17.

²⁶ See *id.* at 35 (describing the efforts of Swedish chemist Svante Arrhenius).

²⁷ Naomi Oreskes, *The Scientific Consensus on Climate Change*, in *CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN* 65, 93 (Joseph F. C. DiMento & Pamela Doughman

climate system by engaging in activities that produce, or release GHGs into the atmosphere.²⁸ Carbon dioxide (CO₂) is the key GHG, and there is evidence that its emissions are largely responsible for the current warming trend.²⁹ Although much of the excess carbon dioxide is absorbed by the oceans, plants and forests, the increase of GHG concentrations resulting from historic and present human activities has altered the Earth's ability to maintain the delicate balance of energy between that which it receives from the sun and that which it radiates back out into space.³⁰

7. Pollution by GHGs is similar to air and water pollution by other naturally occurring substances, such as NO_x, ammonia, phosphates and many metals, that are necessary to sustain life but can disrupt natural systems and damage health and welfare if concentrations rise too high.
8. The average CO₂ concentration in our atmosphere in 2016 was 402.9 ppm.³¹ The pre-industrial concentration was 280 ppm; the last time the atmospheric concentration was as high as in 2016 “was more than 3 million years ago, when temperature was 2-3°C (3.6 - 5.4° F) higher than during the pre-industrial era, and sea level was 15-25 meters (50-80 feet) higher than today.”³² On March 4, 2018, the level of carbon dioxide in the atmosphere had reached 409.97 ppm.³³
9. Concentrations of other GHGs in the atmosphere have also increased due to human

eds., MIT Press 2007) (“We have changed the chemistry of our atmosphere, causing sea level to rise, ice to melt, and climate to change. There is no reason to think otherwise.”).

²⁸ *Id.*

²⁹ See James E. Hansen et al., *Target Atmospheric CO₂: Where Should Humanity Aim?* 2 OPEN ATMOS. SCI. 217, 217-231 (2008).

³⁰ John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN 11, 15-22 (Joseph F. C. DiMento & Pamela Doughman eds., MIT Press 2007).

³¹ Rebecca Lindsey, *Climate Change: Atmospheric Carbon Dioxide* (Oct. 17, 2017), NOAA, Climate.gov, available at <https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide>.

³² *Id.*; see also, IPCC, *AR4* at 37 (“The global atmospheric concentration of CO₂ increased from a pre-industrial value of about 280ppm to 379ppm in 2005.”); National Science and Technology Council, *Scientific Assessment of the Effects of Global Change on the United States 2* (May 2008) [hereinafter *Scientific Assessment*], available at <http://www.climate-science.gov/Library/scientific-assessment/Scientific-AssessmentFINAL.pdf> (“The globally averaged concentration of carbon dioxide in the atmosphere has increased from about 280 parts per million (ppm) in the 18th century to 383 ppm in 2007.”); Environmental Protection Agency (EPA), *Technical Support Document for Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act 17* (December 9 2009) [hereinafter *TS Endangerment Findings*]; Dieter Lüthi et al., *High-resolution carbon dioxide concentration record 650,000-800,000 years before present* 453 *Nature* 379, 379-382 (May 2008) available at <http://www.nature.com/nature/journal/v453/n7193/full/nature06949.html> (prior to this publication it was accepted atmospheric CO₂ record extended back 650,000 years, but now research indicates that the record can be extended 800,000 years, or two complete glacial cycles)..

³³ NOAA, Climate.gov, available at <http://co2now.org/Current-CO2/CO2-Now/Current-Data-for-Atmospheric-CO2.html> (visited March 7, 2018).

activities. As of 2007, when EPA made its Endangerment Finding, atmospheric concentrations of methane had increased nearly 150% since the pre-industrial period and concentrations of nitrous oxide had increased by almost a quarter.³⁴ Although methane is relatively short-lived in the atmosphere, methane concentrations in the atmosphere have continued to rise and recently spiked. At the time of the Endangerment finding, methane concentrations were rising at a rate of about 0.5 parts per billion annually, but in 2014, methane concentrations rose 12.5 parts per billion, and in 2015, they rose 9.9 parts per billion.³⁵

10. Humans continue to add GHGs into the atmosphere at a rate that outpaces their removal through natural processes.³⁶ The current and projected CO₂ increase, for example, is about one hundred times faster than has occurred over the past 800,000 years.³⁷ This increase has to be considered in light of the lifetime of greenhouse gases in the atmosphere. A substantial portion of every ton of CO₂ emitted by humans persists in the atmosphere for as long as a millennium or more.³⁸ The current concentrations of GHGs in the atmosphere therefore, are the result of both historic and current anthropogenic emissions.
11. According to the latest Pennsylvania GHG Inventory, in 2013, Pennsylvania was responsible for emitting 305.75 million metric tons of CO₂e.³⁹ Only approximately eleven percent of those GHGs, or 34.36 million metric tons, is sequestered by the

³⁴ *Endangerment Finding*, 74 Fed. Reg. at 6651718 (“The global atmospheric concentration of methane has increased by 149 percent since pre-industrial levels (through 2007); and the nitrous oxide concentration has increased 23 percent (through 2007).” available at <https://insideclimatenews.org/news/19032018/global-warming-arctic-air-pollution-short-lived-climate-pollutants-methane-black-carbon-hfcs-slep> (visited March 19, 2018).

³⁵ Sabrina Shankman, *These Climate Pollutants Are Short-Lived, But They’re Wreaking Havoc on the Arctic: If we can cut back on methane, black carbon and other short-lived climate pollutants, it could buy time to solve the trickier problem of CO₂*, INSIDE CLIMATE NEWS (March 19, 2018).

³⁶ *TS Endangerment Findings* at ES-2 (“Atmospheric GHG concentrations have been increasing because anthropogenic emissions have been outpacing the rate at which GHGs are removed from the atmosphere by natural processes over timescales of decades to centuries.”).

³⁷ Dieter Lüthi et al., *High-resolution carbon dioxide concentration record 650,000-800,000 years before present* 453 *Nature* 379, 379-382 (May 2008) available at <http://www.nature.com/nature/journal/v453/n7193/full/nature06949.html>.

³⁸ James E. Hansen et al., *Target Atmospheric CO₂: Where Should Humanity Aim?* 2 *OPEN ATMOS. SCI.* 217, 220 (2008); See also EPA, *TS Endangerment Findings* at 16 (“Carbon cycle models indicate that for a pulse of CO₂ emissions, given an equilibrium background, 50% of the atmospheric increase will disappear within 30 years, 30% within a few centuries, and the last 20% may remain in the atmosphere for thousands of years.”); John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in *CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN* 11, 29 (Joseph F. C. DiMento & Pamela Doughman eds., MIT Press 2007) (“Since CO₂ has a lifetime of over one hundred years, these emissions have been collecting for many years in the atmosphere.”).

³⁹ *Pennsylvania Greenhouse Gas Inventory 2016* (2018), at p. 5, Table 1, (*Pa Inventory*) available at [http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/CCAC/Docs/Inventory-2016_1-18-17_\(final\).pdf](http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/CCAC/Docs/Inventory-2016_1-18-17_(final).pdf); see also *CO₂ Emissions from Fossil Fuel Combustion – Million /metric Tons CO₂ (MMTCO₂)* http://www.epa.gov/statelocalclimate/documents/pdf/CO2FFC_2009.pdf See also *Greenhouse Gas Emissions in the Mid-Atlantic Region*, (Jan. 21, 2012) <http://www.epa.gov/reg3artd/globclimate/ccghg.html#Total Emissions>

Commonwealth's private and public forests annually.⁴⁰ According to the draft 2017 inventory, in 2014 the emissions decreased by approximately 3.6 million metric tons of CO₂e, with the largest decrease in the electricity generation sector, largely due to the switch from coal to natural gas, and the decreases in that sector, transportation and agricultural sectors being partially offset by increases in residential commercial, industrial and waste categories.⁴¹

12. Pennsylvania's GHG emissions are globally significant. Pennsylvania is the third largest CO₂ emitter after Texas and California, emitting 4.3% of total US GHG emissions in 2014⁴² and 0.86 percent of total global emissions (which totaled 35.7 billion metric tons in 2014).⁴³ At 19.4 metric tons per year, Pennsylvania's per capita energy-related GHG emissions were greater than the US national average of 16.9 metric tons per year in 2015.⁴⁴ Pennsylvania's total GHG emissions in 2014 exceeded all but 21 nations of the world, with 16 nations exceeding Pennsylvania and Pennsylvania's emissions being approximately the same as 5 nations.⁴⁵ Pennsylvania's per capita emissions exceeded those of all of the nations in the world in 2014, and were more than double the per capita emissions of Germany (9.3) and China (7.6) and three times the per capita emissions of the UK (6.5), France (5.0) and Italy (5.5).⁴⁶
13. One key observable change from the rising levels of GHG pollution in the atmosphere is the rapid increase in recorded global surface temperatures.⁴⁷ As a result of increased atmospheric GHGs from human activities, based on fundamental scientific principles, the Earth has been warming as scientists have predicted.⁴⁸ The increased concentrations of

⁴⁰ Pa Inventory, at 5, Table 1; *see also*, *Carbon Sequestration*, Pennsylvania Department of Conservation and Natural Resources, <http://www.dcnr.state.pa.us/info/carbon/index.aspx>

⁴¹ *Presentation of Draft Pennsylvania Greenhouse Gas Inventory 2017 to Climate Change Advisory Committee*, available at http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/CCAC/2017/8-7-17/Emission_Inventory_for_8-7_CCAC_meeting_r1.pdf.

⁴² Johannes Friedrich Johannes Friedrich, Mengpin Ge & Alexander Tankou, *6 Charts to Understand U.S. State Greenhouse Gas Emissions*, World Resources Institute (Aug. 10, 2017), available at <http://www.wri.org/blog/2017/08/6-charts-understand-us-state-greenhouse-gas-emissions> (visited March 19, 2018).

⁴³ *Trends in Global CO₂ Emissions 2015 Report*, PBL Netherlands Environmental Assessment Agency (2015) at 10, available at http://edgar.jrc.ec.europa.eu/news_docs/jrc-2015-trends-in-global-co2-emissions-2015-report-98184.pdf (visited March 18, 2018) ("*Global Trends*").

⁴⁴ EIA, *Energy-Related Carbon Dioxide Emissions by State, 2000–2015* (January 2018) at 15, Table 5, available at

<https://www.eia.gov/environment/emissions/state/analysis/pdf/stateanalysis.pdf> (visited March 19, 2018).

⁴⁵ *Global Trends*, *supra* at 28-29, table 2.3.

⁴⁶ *Global Trends* at 3, Table 2.4.

⁴⁷ National Science and Technology Council, *Scientific Assessment* at 51; IPCC, *AR4* at 30; USGCRP, *Global Climate Change Impacts* at 19; EPA, *TS Endangerment Findings* 26-30; National Aeronautics and Space Administration (NASA) & Goddard Institute for Space Studies (GISS), *Global Surface Temperature*, <http://climate.nasa.gov/keyIndicators/#globalTemp> (illustrating the change in global surface temperatures) (last visited April 7, 2011).

⁴⁸ IPCC, *AR4* at 39; USGCRP, *Global Climate Change Impacts* at 13; EPA, *TS Endangerment Findings* at 48.

greenhouse gases in our atmosphere, primarily CO₂,⁴⁹ have raised global surface temperature by 1.4°F (0.8°C) in the last one hundred to one hundred fifty years.⁵⁰ In the last thirty years, the acceleration of change has intensified as the Earth has been warming at a rate three times faster than that over the previous one hundred years.⁵¹

14. Because of year-to-year variations in these thermometer readings, as with daily readings, scientists compare temperature differences over a decade to determine patterns.⁵² Employing this decadal scale, the surface of the planet has warmed at a rate of roughly 0.3 to 0.4°F (0.15 to 0.2°C) per decade since the late 1970s.⁵³ Global mean surface temperature has been decidedly higher during the last few decades of the twentieth century than at any time during the preceding four centuries.⁵⁴ Global surface temperatures have been rising dramatically since 1951. “Seventeen of the 18 warmest years in the 136-year record all have occurred since 2001 with the exception of 1998. The year 2016 ranks as the warmest on record.”⁵⁵
15. The dramatic increase of the average global surface temperature is alarming. By comparison, the global surface temperature during the last Ice Age was about 9°F (5°C) cooler than today.⁵⁶ It has become quite clear that the past several decades present an

⁴⁹ EPA, *Climate Change – Science*, available at <http://epa.gov/climatechange/science/index.html> (August 19, 2010) (last visited April 7, 2011); EPA, *TS Endangerment Findings* at ES-1-2.

⁵⁰ EPA, *TS Endangerment Findings* at ES-2 (“Global mean surface temperatures have risen by 1.3 ± 0.32°F (0.74°C ± 0.18°C) over the last 100 years.”); See J. Hansen et al., NASA & GISS, *Global Surface Temperature Change* (August 3, 2010); NASA, *Climate Change: Key Indicators*, <http://climate.nasa.gov/keyIndicators> (last visited April 7, 2011); John Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts*, in CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN 11, 15-22 (Joseph F. C. DiMento & Pamela Doughman eds., MIT Press 2007).

⁵¹ EPA, *TS Endangerment Findings* at 32 (“U.S. average annual temperatures (for the contiguous United States or lower 48 states) are now approximately 1.25°F (0.69°C) warmer than at the start of the 20th century, with an increased rate of warming over the past 30 years. The rate of warming for the entire period of record (1901–2008) is 0.13°F (0.072°C) per decade while the rate of warming increased to 0.58°F (0.32°C) per decade for the period 1979–2008.”); USGCRP, *Global Climate Change Impacts* at 9.

⁵² IPCC, *AR4* at 40.

⁵³ See NASA, *Climate Change: Key Indicators, Global Land-Ocean Temperature Index*, <http://climate.nasa.gov/keyIndicators/#globalTemp> (last visited April 7, 2011).

⁵⁴ The National Academies Press (Board on Atmospheric Sciences and Climate), *Surface Temperature Reconstructions for the Last 2,000 Years* 3 (2006), available at http://www.nap.edu/catalog.php?record_id=11676.

⁵⁵ NASA, *Global Climate Change – Global Surface Temperature*, <http://climate.nasa.gov/keyIndicators/index.cfm#globalTemp> (last visited March 7, 2018); NASA, *Global Climate Change*, <https://climate.nasa.gov/evidence/> (last visited March 7, 2018) (“Most of the warming occurred in the past 35 years, with 16 of the 17 warmest years on record occurring since 2001. Not only was 2016 the warmest year on record, but eight of the 12 months that make up the year — from January through September, with the exception of June — were the warmest on record for those respective months.”).

⁵⁶ James E. Hansen & Makiko Sato, *Paleoclimate Implications for Human-Made Climate Change* 5 (January 18, 2011), available at

anomaly, as global surface temperatures are registering higher than at any point in the past 400 years (and for the Northern Hemisphere the past 1,000 years).⁵⁷

16. The IPCC has observed that “[w]arming of the climate system is unequivocal”.⁵⁸ The United States EPA has recognized the scientific consensus that has developed on the fact of global warming and its cause; that the Earth is heating up and the climate is being disrupted due to human activities.⁵⁹
17. Reports by the United States Academy of Sciences have consistently concluded that anthropogenic emissions of GHGs are disrupting the climate. that this disruption will increase without significant emissions reductions, and that there is a potential for abrupt and disastrous impacts.⁶⁰
18. Changes in many different aspects of Earth’s climate system over the past century are consistent with this warming trend: based on straightforward scientific principles, human-induced GHG increases lead not only to warming of land surfaces⁶¹, but also to the warming of oceans⁶², increased atmospheric moisture levels⁶³, rises in the global sea level⁶⁴, and changes in rainfall⁶⁵ and atmospheric air circulation patterns that affect water and heat distribution.⁶⁶
19. Although there is some uncertainty, most of the possible variation falls on the side of greater disruption. For example, reports developed since the 2013 IPCC report have determined that sea level rise due to melting glaciers will be more rapid than estimated.

http://www.columbia.edu/~jeh1/mailings/2011/20110118_MilankovicPaper.pdf (last visited April 10, 2011).

⁵⁷ USGCRP, *Global Climate Change Impacts* at 19.

⁵⁸ *See supra*, note 2.

⁵⁹ EPA, *TS Endangerment Findings* at ES-2 (“Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. ... Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in *anthropogenic* GHG concentrations.”) (emphasis added).

⁶⁰ *See, e.g.*, National Research Council, *Climate Change 2013: The Physical Science Basis* (2013), <http://www.ipcc.ch/report/ar5/wg1/>; National Research Council, *Climate Stabilization Targets: Emissions, Concentrations, and Impacts over Decades to Millennia* (2011), <https://www.nap.edu/catalog/12877/climate-stabilization-targets-emissions-concentrations-and-impacts-over-decades-to>; National Research Council, *Abrupt Impacts of Climate Change: Anticipating Surprises* (2013), <https://www.nap.edu/catalog/18373/abrupt-impacts-of-climate-change-anticipating-surprises>.

⁶¹ IPCC, *AR4* at 30.

⁶² *Id.* at 72.

⁶³ USGCRP, *Global Climate Change Impacts* at 18; B.D Santer et al., *Identification of human-induced changes in atmospheric moisture content*, 104 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES, 15248, 15248-15253 (September 25, 2007).

⁶⁴ IPCC, *AR4* at 30.

⁶⁵ USGCRP, *Global Climate Change Impacts* at 18, 44.

⁶⁶ *Id.* at 42.

That 2013 IPCC assessment estimated that sea levels could rise from between 44 cm and 74 cm by 2100.⁶⁷ A study published in 2018 based on 25 years of satellite data showed accelerated rates of sea level rise driven by the melting of the Greenland and Antarctic ice sheets and predicted that if these rates continue, sea levels would rise by 65 centimeters or 26 inches by 2100 compared to past estimate, or about double the rate originally estimated.⁶⁸

20. As expected (and consistent with the temperature increases in land surfaces), ocean temperatures have also increased.⁶⁹ This has led to changes in the ocean's ability to circulate heat around the globe; which can have catastrophic implications for the global climate system.⁷⁰ Two studies published in *Nature* in 2018 determined that freshwater from melting glaciers had slowed the Atlantic meridional overturning circulation to an extent not evident over the last 1,600 years.⁷¹ The average temperature of the global ocean has increased significantly despite its ability to absorb enormous amounts of heat before exhibiting any signs.⁷² In addition, the most significant indicator of the planet's energy imbalance due to human-induced GHG increases, is the long-term increase in global average ocean heat content over the last 50 years, extending down to several thousand meters below the ocean surface.⁷³
21. As predicted, precipitation patterns have changed due to increases in atmospheric moisture levels and changes in atmospheric air circulation patterns; just another indicator that the Earth is warming.⁷⁴ As the Earth warms, moisture levels are expected to increase when temperature increases because warmer air generally holds more moisture.⁷⁵ In more arid regions, however, higher temperatures lead to greater evaporation.⁷⁶
22. These changes in the Earth's water cycle increase the potential for, and severity of, severe storms, flooding and droughts.⁷⁷ Storm-prone areas are already experiencing a greater chance of severe storms, and this will continue.⁷⁸ Precipitation intensity is likely to increase across the United States, with increased prevalence of flash flooding, coupled

⁶⁷ John A. Church, Peter U. Clark et al. *Sea Level Change*, IPCC, Climate Change 2013: The Physical Science Basis, Chapter 13, at 1182, Table 13.5 (2013), available at <http://www.ipcc.ch/report/ar5/wg1/>.

⁶⁸ R. S. Nerem, B. D. Beckley, J. T. Fasullo, B. D. Hamlington, D. Masters and G. T. Mitchum, *Climate-change-driven accelerated sea-level rise detected in the altimeter era*, 115 *Proceedings Nat'l Academy Sciences* 2022-2025 (Feb. 2018), available at <https://doi.org/10.1073/pnas.1717312115>.

⁶⁹ IPCC, *AR4* at 30; EPA, *TS Endangerment Findings* at ES-2.

⁷⁰ USGCRP, *Global Climate Change Impacts* at 26.

⁷¹ Summer K. Praetorius, North Atlantic circulation slows down, 556 *Nature* 180 *2018), available at <https://www.nature.com/magazine-assets/d41586-018-04086-4/d41586-018-04086-4.pdf>.

⁷² UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP), CLIMATE CHANGE SCIENCE COMPENDIUM 2009 at 26 (UNEP/Earthprint, 2009).

⁷³ S. Levitus et al., *Global ocean heat content 1955-2008 in light of recently revealed instrumentation problems* 36 *J. GEOPHYSICAL RES. LETTERS* L07608 (April 2009).

⁷⁴ USGCRP, *Global Climate Change Impacts* at 13, 17, 21, 36, 42, 74.

⁷⁵ EPA, *TS Endangerment Findings* at 111.

⁷⁶ *Id.*

⁷⁷ *Id.*

⁷⁸ *Id.* at 120-121; USGCRP, *Global Climate Change Impacts* at 27.

with increased droughts between these intense precipitation events.⁷⁹

23. These changes are already occurring: droughts in parts of the midwestern, southeastern, and southwestern United States have increased in frequency and severity within the last fifty years, coinciding with rising temperatures.⁸⁰ In 2009, more than half of the United States received above normal precipitation; yet the southwestern United States (Arizona in particular) had one of its driest periods.⁸¹
24. Based on the laws of physics and the past climate record, scientists have concluded that precipitation events will increase globally, particularly in tropical and high latitude regions, while decreasing in subtropical and mid-latitude regions,⁸² with longer periods between normal heavy rainfalls.⁸³
25. Other changes consistent with climate modeling resulting from global warming have been observed not just in the amount, intensity, and frequency of precipitation but also in the type of precipitation.⁸⁴ In higher altitude and latitude regions, including in mountainous areas, more precipitation is falling as rain rather than snow.⁸⁵ With early snow melt occurring because of climate change, the reduction in snowpack can aggravate water supply problems.⁸⁶ In Northern Europe and the northeastern United States, a change in air currents -- caused by the warming Arctic -- brought severe snowstorms during the winters of 2009-2010.⁸⁷
26. As expected, global sea levels have also risen.⁸⁸ Sea levels have been rising at an average rate of 3.1 millimeters per year based on measurements from 1993 to 2003.⁸⁹ Sea levels rose about 8 inches over the last century, with the rate nearly doubling in the last two decades.⁹⁰ Rising seas, brought about by melting of polar icecaps and glaciers, as well as by thermal expansion of the warming oceans, will cause flooding in coastal and low-lying

⁷⁹ EPA, *TS Endangerment Findings* at 115.

⁸⁰ *Id.* at 145, 143, 148.

⁸¹ *State of the Climate, 2009* at S138.

⁸² EPA, *TS Endangerment Findings* at ES-4, 74.

⁸³ EPA, *TS Endangerment Findings* at 74.

⁸⁴ *Id.* at ES-2.

⁸⁵ USGCRP, *Global Climate Change Impacts* at 18, 45.

⁸⁶ *Id.* at 33

⁸⁷ NOAA, *Arctic Report Card: Update for 2010*, (December 10, 2010) (last visited November 16, 2018) available at ftp://ftp.oar.noaa.gov/arctic/documents/ArcticReportCard_full_report2010.pdf) at 13, 15; See also Climate Science Watch, *Climatologist Ben Santer on the attribution of extreme weather events to climate change*, (December 29, 2010) (last visited April 9, 2011) <http://climateprogress.org/2010/12/29/ben-santer-attribution-extreme-weather-events-to-climate-change/#more>.

⁸⁸ USGCRP, *Global Climate Change Impacts*, at 10; EPA, *TS Endangerment Findings* at ES-3; IPCC, *AR5* at 42.

⁸⁹ IPCC, *AR5* at 124.

⁹⁰ NASA, *Climate Change: How Do We Know?, Sea Level Rise* (last visited November 16, 2018) <http://climate.nasa.gov/evidence/#no4> (citing J.A. Church & N.J. White, *A 20th Century Acceleration in Global Sea Level Rise* (2006) 33 *Geophysical Research Letters*, L01602, doi: 10.1029/2005GL024826).

areas.⁹¹ The combination of rising sea levels and more severe storms creates conditions conducive to severe storm surges during high tides.⁹² In coastal communities this can overwhelm coastal defenses (such as levees and sea walls), as witnessed during Hurricane Katrina.⁹³

27. Sea level is not uniform across the globe, because it depends on variables such as ocean temperature and currents.⁹⁴ Unsurprisingly, the most vulnerable lands are low-lying islands, river deltas, and areas that already lie below sea level because of land subsidence.⁹⁵ Based on these factors, scientists have concluded that the threats to the United States from rising seas are the most severe on the Gulf and Atlantic Coasts.⁹⁶ Worldwide, hundreds of millions of people live in river deltas and vulnerable coastlines along the southern and eastern coasts of Asia where rivers draining the Himalayas flow into the Indian and Pacific Oceans.⁹⁷
28. In a comprehensive review of studies on sea level rise in the 21st century published by the British Royal Society, researchers estimated the probable sea level rise for this century between .5 and 2 meters (1.5 to 6.5 feet), continuing to rise for several centuries after that, depending on future CO₂ levels and the behavior of polar ice sheets.⁹⁸
29. The IPCC and other scientists estimate a 1 to 2 meter rise in sea level by 2100 that does not include flows of major ice sheets.⁹⁹ “Today, rising sea levels are submerging low-lying lands, eroding beaches, converting wetlands to open water, exacerbating coastal flooding, and increasing the salinity of estuaries and freshwater aquifers.”¹⁰⁰ The impacts of rising sea levels can be seen in many coastal locations across the nation; along the Florida coast for instance, sea level is rising about 1 inch every 11-14 years.¹⁰¹ This

⁹¹ EPA, *TS Endangerment Findings* at ES-7; USGCRP, *Global Climate Change Impacts* at 25, 62-63.

⁹² USGCRP, *Global Climate Change Impacts* at 109; EPA, *TS Endangerment Findings* at 75.

⁹³ EPA, *TS Endangerment Findings* at 86, 118.

⁹⁴ USGCRP, *Global Climate Change Impacts* at 25-26, 37.

⁹⁵ EPA, *TS Endangerment Findings* at 121.

⁹⁶ *Id.* at 128; USGCRP, *Global Climate Change Impacts* at 57.

⁹⁷ EPA, *TS Endangerment Findings* at 159; IPCC, *AR4* at 52.

⁹⁸ R.J. Nicholls et al., *Sea-level rise and its possible impacts given a ‘beyond 4°C world’ in the twenty-first century*, PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY 161-181, 168 (2011).

⁹⁹ IPCC, *AR5* at 47; M. Vermeer & S. Rahmstorf, *Global Sea Level Linked to Global Temperature*, 106 PROC. NATL. ACAD. SCI. 21527, 21531 (2009).

¹⁰⁰ U.S. Climate Change Science Program, USCCSP, *Coastal Sensitivity to Sea-Level Rise: A Focus on the Mid-Atlantic Region* [hereinafter *Coastal Sensitivity to Sea-Level Rise*] 2 (Jan. 2009), available at <https://www.globalchange.gov/sites/globalchange/files/sap4-1-final-report-all.pdf>.

¹⁰¹ EPA, *Saving Florida’s Vanishing Shores* (March 2002) available at <https://nepis.epa.gov/Exe/ZyNET.exe/0000014E.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2000+Thru+2005&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C00thru05%5CTxt%5C00000004%5C0000014E.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=h>

seemingly small rise in ocean levels is contributing to massive erosion, causing many homeowners to remove beachfront property, and has led to a decline in the recreational value of beaches.¹⁰² Other coastal states (such as Maryland and Louisiana) are also experiencing wetland loss due to rising sea levels.¹⁰³ Scientists have predicted that wetlands in the Mid-Atlantic region of the United States cannot withstand a 7-millimeter per year rise in sea levels.¹⁰⁴

30. As expected, mountain glaciers, which are the source of freshwater for hundreds of millions of people, are receding worldwide because of warming temperatures.¹⁰⁵ In 2010, Glacier National Park in Montana had twenty-five glaciers larger than twenty-five acres, down from one hundred and fifty in 1850.¹⁰⁶ The year 2017 marked the 38th consecutive year in which glaciers lost mass.¹⁰⁷ Mountain glaciers are in retreat all over the world, including Mt. Kilimanjaro in Africa, the Himalayas, the Alps (99% in retreat), the glaciers of Peru and Chile (92% in retreat), and in the United States.¹⁰⁸ In the Brooks Range of northern Alaska, all of the glaciers are in retreat and, in southeastern Alaska, 98% are in retreat.¹⁰⁹
31. Although a minor contribution to sea level rise, the melting of mountain glaciers is particularly serious in areas that rely on snow melt for irrigation and drinking water supply.¹¹⁰ In effect, a large snow pack or glacier acts as a supplemental reservoir or water tower, holding a great deal of water in the form of ice and snow through the winter and spring and releasing it in the summer when rainfall is lower or absent.¹¹¹ The water systems of the western United States (particularly in California) and the Andean nations of Peru and Chile, among other places, all heavily rely on these natural forms of water storage.¹¹² In addition to providing a more reliable water supply, the storing of

[pfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL.](#)

¹⁰² *Id.*

¹⁰³ USCCSP, *Coastal Sensitivity to Sea-Level Rise*, at 3-4.

¹⁰⁴ *Id.* at 4.

¹⁰⁵ See *TS Endangerment Findings* at 111 (“Glaciers throughout North America are melting, and the particularly rapid retreat of Alaskan glaciers represents about half of the estimated loss of glacial mass worldwide.”).

¹⁰⁶ United States Geological Survey (Northern Rocky Mountain Science Center), *Retreat of Glaciers in Glacier National Park* (June 2010), https://www.usgs.gov/centers/norock/science/retreat-glaciers-glacier-national-park?qt-science_center_objects=0#qt-science_center_objects

¹⁰⁷ National Oceanic and Atmospheric (NOAA), *State of the Climate in 2017*, 99 BULL. AMER. METEOR. SOC. at xvi (2017).

¹⁰⁸ L. Thompson, *Climate Change: The Evidence and Our Options*, 33 THE BEHAVIOR ANALYST No. 2 (Fall) 153, 155-160 (2010); USGRCP, *Global Climate Change Impacts* at 18.

¹⁰⁹ L. Thompson, *Climate Change: The Evidence and Our Options*, 33 THE BEHAVIOR ANALYST No. 2 (Fall) 153, 158 (2010).

¹¹⁰ IPCC, *AR4* at 49.

¹¹¹ See L. Thompson, *Climate Change: The Evidence and Our Options*, 33 THE BEHAVIOR ANALYST No. 2 (Fall) 153, 164 (2010).

¹¹² See *Id.* at 155 – 160, 164.

precipitation as ice and snow helps moderate potential flooding.¹¹³

32. Yet as temperatures warm, not only will these areas lose this supplemental form of water storage, but also severe flooding is likely to increase (because when rain falls on snow, it accelerates the melting of glaciers and snow packs).¹¹⁴ Ice is melting most dramatically at the poles.¹¹⁵ Sea ice in the Arctic oceans is expected to decrease and may even disappear entirely in coming decades.¹¹⁶
33. Beginning in late 2000, the Jakobshavn Isbrae Glacier (which has a major influence over the mass of the Greenland ice sheet), lost significant amounts of ice.¹¹⁷ In August 2010, an enormous iceberg (roughly ninety-seven square miles in size) broke off from Greenland.¹¹⁸ Nine Antarctic ice shelves have also collapsed into icebergs between 1959 and 2009, (six of them after 1996).¹¹⁹ An ice shelf roughly the size of Rhode Island collapsed in 2002, an ice bridge collapsed in 2009, leaving an ice shelf the size of Jamaica on the verge of shearing off, and in 2018 an ice sheet twice the size of Luxembourg calved.¹²⁰ The 2002 collapse of the Larsen Ice Shelf, which had existed for at least 11,000 years, was “unprecedented in respect to both area and time.”¹²¹ The “sudden and complete disintegration” of the Larsen Ice Shelf took a *mere 35 days*.¹²²
34. During the 2007-melt season, the extent of Arctic sea ice (frozen ocean water) declined precipitously to its lowest level since satellite measurements began in 1979.¹²³ By the end

¹¹³ EPA, *TS Endangerment Findings* at 111; USGRCP, *Global Climate Change Impacts* at 64.

¹¹⁴ EPA, *TS Endangerment Findings* at 111.

¹¹⁵ L. Thompson, *Climate Change: The Evidence and Our Options*, 33 THE BEHAVIOR ANALYST No. 2 (Fall) 153, 160 (2010) (“[P]olar ice sheets are slower to respond to temperature rise than the smaller mountain glaciers, but they too, are melting. . . . The loss of ice in the Arctic and Antarctic regions is especially troubling because these are the locations of the largest ice sheets in the world.”).

¹¹⁶ EPA, *TS Endangerment Findings* at 120; USGRCP, *Global Climate Change Impacts* at 20-21 (“Studies published after the appearance of the IPCC Fourth Assessment Report in 2007 have also found human fingerprints in the increased levels of atmospheric moisture (both close to the surface and over the full extent of the atmosphere), in the decline of Arctic sea ice extent, and in the patterns of change in Arctic and Antarctic surface temperatures.”).

¹¹⁷ GARY BRAASCH & BILL MCKIBBEN, *EARTH UNDER FIRE* 18-20 (2009); *See also* J.E. Box et. al., (NOAA) *Greenland*, ARCTIC REPORT CARD at 55 (Oct. 2010) (“A clear pattern of exceptional and record-setting warm air temperatures is evident at long-term meteorological stations around Greenland.”).

¹¹⁸ NASA Earth Observatory, *Ice Island Calves Off Petermann Glacier* (Aug. 2010), <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=45112&src=eorss-nh>.

¹¹⁹ Alister Doyle, *Antarctic Ice Shelf Set to Collapse Due to Warming*, Reuters (Jan. 19, 2009) <http://www.reuters.com/article/idUSTRE50I4G520090119>.

¹²⁰ NASA Earth Observatory, *Wilkins Ice Bridge Collapse* (April 2009), <http://earthobservatory.nasa.gov/IOTD/view.php?id=37806>; *see also* *Expected Sea-Level Rise Following Antarctic Ice Shelves' Collapse*, SCIENCE DAILY (July, 2018), <https://www.sciencedaily.com/releases/2018/07/180719085424.htm>.

¹²¹ U.S. Geological Survey, *Coastal-Change and Glaciological Map of the Larsen Ice Shelf Area, Antarctica: 1940-2005* at 10 (2008) <http://pubs.usgs.gov/imap/2600/B/Larsenpamphlet12600B.pdf>

¹²² *Id.* at 10.

¹²³ National Snow and Ice Data Center (NSDIC), Press Release, *Arctic Sea Ice Shatters All Previous Record Lows* (October 1, 2007),

of 2010 Arctic sea ice was at the lowest level in the satellite record for the month of December.¹²⁴ Continuing the trends of the last several years, ice formation in the autumn of 2018 lagged significantly behind averages from the 30 years prior to 2010.¹²⁵

35. Arctic sea ice plays an important role in stabilizing the global climate, because it reflects back in to space much of the solar radiation that the region receives.¹²⁶ In contrast, open ocean water absorbs much more heat from the sun, thus, amplifying human-induced warming and creating an increased global warming effect.¹²⁷ As arctic sea ice decreases, the region is less capable of stabilizing the global climate and may act as a feedback loop (thereby exacerbating global warming).¹²⁸
36. Scientists have also documented an overall trend of sea-ice thinning.¹²⁹ The year 2017 marked the 11th time in the past 12 years, and 12th consecutive June, with lower spring Canadian and American Arctic snow cover than averages from the 1981-2010 period.¹³⁰
37. There has been a general increase in permafrost temperatures and permafrost melting in Alaska and other parts of the Arctic (particularly since 2000). Permafrost temperatures in 2016 were among the highest on record (since 1978) with the greatest increases in cold permafrost.¹³¹ Because much of the Arctic permafrost overlays old peat bogs, scientists believe (and are concerned) that the melting of the permafrost¹³² may release methane that will further increase global warming to even more dangerous levels.¹³³
38. Changes in these different aspects of Earth's climate system over the last century tell a coherent story: the impacts we see today are consistent with the scientific understanding of

http://nsidc.org/news/press/2007_seaiceminimum/20071001_pressrelease.html (last visited April 9, 2011); EPA, *TS Endangerment Findings* at 27 (“Average arctic temperatures increased at almost twice the global average rate in the past 100 years.”).

¹²⁴ NSIDC, *Repeat of a negative Arctic Oscillation leads to warm Arctic, low sea ice extent*, ARCTIC SEA ICE NEWS & ANALYSIS, (January 5, 2011), <http://nsidc.org/arcticseaicenews/2011/010511.html> (last visited November 16, 2018).

¹²⁵ NSIDC, *Unusual Warmth Continues*, ARCTIC SEA ICE NEWS & ANALYSIS (November 5, 2018) <http://nsidc.org/arcticseaicenews/2018/11/unusual-warmth-continues/> (last visited November 16, 2018).

¹²⁶ EPA, *Climate Change Indicators in the United States*, 39 (2016), available at https://www.epa.gov/sites/production/files/2016-08/documents/climate_indicators_2016.pdf [hereinafter *Climate Change Indicators*]; See also EPA, *TS Endangerment Findings* at 40.

¹²⁷ EPA, *Climate Change Indicators* 52 (2010); USGCRP, *Global Climate Change Impacts* at 39.

¹²⁸ EPA, *Climate Change Indicators*, *supra* note 121.

¹²⁹ NOAA, *State of the Climate in 2017*, *supra* note 102, at sxvi.

¹³⁰ Derksen, C., R. Brown, L. Mudryk, K. Luoju, & S. Helfrich, *Terrestrial Snow Cover*, ARCTIC REPORT CARD (2017), available at ftp://ftp.oar.noaa.gov/arctic/documents/ArcticReportCard_full_report2017.pdf.

¹³¹ J. Richter-Menge, J.E. Overland, J.T. Mathis, & E. Osborne, *Executive Summary*, ARCTIC REPORT CARD, *supra*.

¹³² *Id.*, see also, USGCRP, *Global Climate Change Impacts* at 139, 142 (“The higher temperatures are already contributing to . . . permafrost warming.”).

¹³³ See IPCC, *4.4.6 Tundra and Arctic/Antarctic Ecosystems*, CLIMATE CHANGE 2007: FOURTH ASSESSMENT REPORT, WORKING GROUP II, IMPACTS, ADAPTATION, AND VULNERABILITY 231 (2007).

how the climate system should respond to GHG increases from human activities and how the Earth has responded in the past (reflected in such evidence as: ice cores that have trapped air from thousands and even a few million years ago, tree rings and seabed sediments that show where sea level was thousands and even millions of years ago).¹³⁴ Collectively, these changes cannot be explained as the product of natural climate variability or a tilt in the Earth's axis alone.¹³⁵ A large human contribution provides the best explanation of observed climate changes.¹³⁶

39. These well-documented and observable impacts from the changes in Earth's climate system highlight that the current level of atmospheric CO₂ concentration has already taken the planet into a danger zone.¹³⁷ The Earth will continue to warm in reaction to concentrations of CO₂ from past emissions as well as future emissions.¹³⁸ Warming already in the pipeline is mostly attributable to climate mechanisms that slowly heat the Earth's climate system in response to atmospheric CO₂.¹³⁹
40. The Earth's oceans play a significant role in keeping our atmospheric climate in the safe-zone.¹⁴⁰ The oceans constantly absorb CO₂ and release it back into the atmosphere at rates that maintain a balance.¹⁴¹ Because we now release so much CO₂, the oceans have absorbed about one-third of the CO₂ emitted from human activity over the past two centuries.¹⁴² This capacity has slowed global warming, but at a cost: the added CO₂ has changed the chemistry of the oceans, causing the oceans' average surface pH (a measurement of hydrogen ions) to drop by an average of .1 units.¹⁴³ Although this may seem relatively small, the pH scale is logarithmic, so that a reduction of only one unit means that the solution has in fact become ten times more acidic.¹⁴⁴ A drop of .1 pH units means that the concentration of hydrogen ions in seawater has gone up by 30% in the past

¹³⁴ USGCRP, *Global Climate Change Impacts* at 26.

¹³⁵ *Id.* at 14-16.

¹³⁶ Susan Solomon et al., *Irreversible climate change due to carbon dioxide emissions*, 106 PNAS 1704, 1704 – 1709 (Feb. 10, 2009), available at www.pnas.org/cgi/doi/10.1073/pnas.0812721106 (last visited November 16, 2018).

¹³⁷ USGCRP, *Global Climate Change Impacts* at 23.

¹³⁸ USGCRP, *Global Climate Change Impacts* at 14-16, 84-; see also, EPA, *TS Endangerment Findings* at 26.

¹³⁹ Fred Pearce, WITH SPEED AND VIOLENCE: WHY SCIENTISTS FEAR TIPPING POINTS IN CLIMATE CHANGE 101-104 (Beacon Press 2007); IPCC, *AR4* at 72.

¹⁴⁰ See EPA, *TS Endangerment Findings* at 16, 38.

¹⁴¹ IPCC, *AR5* at 4.

¹⁴² Inter-Agency Working Group on Ocean Acidification, *Strategic Plan for Federal Research and Monitoring of Ocean Acidification* (March 2014) (“Inter-Agency Report, *Impacts of Ocean Acidification*”) at 10, available at

<ftp://ftp.oar.noaa.gov/OA/IWGOA%20documents/IWGOA%20Strategic%20Plan.pdf>; see also *TS Endangerment Findings* at 38 (“[T]he total inorganic carbon content of the oceans increased by 118 ± 19 gigatonnes of carbon (GtC) between 1750 and 1994 and continues to increase.”).

¹⁴³ Inter-Agency Report, *Ocean Acidification* at 10; USGCRP, *Global Climate Change Impacts* at 17, EPA, *TS Endangerment Findings* at 38.

¹⁴⁴ HARVEY BLATT, *AMERICA'S ENVIRONMENTAL REPORT CARD 158* (MIT Press 2005).

two centuries.¹⁴⁵ If CO₂ levels continue to rise to 500 ppm, we could see a further drop of .3 pH units by 2100.¹⁴⁶

41. Ocean acidification harms animals that use calcium to build their shells, as well as single-celled organisms that are an essential part of the marine food chain.¹⁴⁷ This is because the acidified waters affect the structural integrity and survival of shell-building marine organisms such as corals and shellfish by effectively robbing them of the key chemical (carbonate ion) they need to build their skeletons.¹⁴⁸ It also adversely impacts some kinds of algae and single-celled organisms that use calcification processes for survival.¹⁴⁹ Some of these organisms comprise magnificent natural features, such as the White Cliffs of Dover.¹⁵⁰ Coral reefs are major habitats for ocean fauna; and calcifying algae and plankton are key components of the marine food chain.¹⁵¹
42. About 55 million years ago, the ocean absorbed a large amount of CO₂, likely due to a release of methane from the ocean floor that caused the Earth's temperatures to rise several degrees and led to the extinction of many species worldwide.¹⁵² The absorption of so much CO₂ also led to the death of calcifying organisms on the seafloor.¹⁵³ It took over 100,000 years for the ocean to regain its normal alkalinity.¹⁵⁴ The current level of CO₂ being taken in by the ocean decreases the ability of coral and other calcium-based marine life to produce their skeletons, which affects the growing of coral and thus coral reefs.¹⁵⁵
43. The warming of oceans contributes to the bleaching of corals.¹⁵⁶ Corals contain tiny algae that provide them with food and that account for their color.¹⁵⁷ When the oceans warm, the algae give off toxins, and the corals, in order to survive the toxin, expel the algae, thereby

¹⁴⁵ A. Ridgwell & D. Schmidt, *Past constraints on the vulnerability of marine calcifiers to massive carbon dioxide release*, 3 NATURE GEOSCIENCE 196, 196-200 (2010).

¹⁴⁶ IPCC, *AR5* at 12.

¹⁴⁷ EPA, *TS Endangerment Findings* at 38.

¹⁴⁸ USGCRP, *Global Climate Change Impacts* at 85.

¹⁴⁹ *Id.*

¹⁵⁰ Carl Zimmer, *An Ominous Warning on the Effects of Ocean Acidification*, Yale Environment360, (February 15, 2010), available at

http://e360.yale.edu/feature/an_ominous_warning_on_the_effects_of_ocean_acidification/2241/ (last visited November 17, 2018).

¹⁵¹ EPA, *Coral Reef Biological Criteria: Using the Clean Water Act to Protect a National Treasure 3-1* (July 2010), available at

https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NHEERL&dirEntryID=223392 (last visited November 17, 2018).

¹⁵² James C. Zachos et al., *Rapid Acidification of the Ocean During the Paleocene-Eocene Thermal Maximum*, 308 SCIENCE 1611, 1611-1615 (June 10, 2005).

¹⁵³ *Id.*

¹⁵⁴ *Id.*

¹⁵⁵ Inter-Agency Report, *Ocean Acidification* at 10.

¹⁵⁶ EPA, *TS Endangerment Findings* at 103; USGCRP, *Global Climate Change Impacts* at 148.

¹⁵⁷ USGCRP, *Global Climate Change Impacts* at 84, 151-52; See EPA, *TS Endangerment Findings* at 138.

bleaching the coral.¹⁵⁸ If the water temperature does not fall enough to permit algae to survive within the coral without releasing the toxin, the corals will eventually die.¹⁵⁹ There have been several severe episodes of coral bleaching in recent years.¹⁶⁰ With continued warming, the coral may not be able to survive.¹⁶¹

44. Changes in water supply and water quality will also impact agriculture in the US.¹⁶² Additionally, increased heat and associated issues such as pests, crop diseases, and weather extremes, will all impact crop and livestock production and quality.¹⁶³ For example, climate change in the United States has produced warmer summers, enabling the mountain pine beetle to produce two generations of beetles in a single summer season, where it had previously only been able to produce one; in Alaska, the spruce beetle is maturing in one year when it had previously taken two years.¹⁶⁴ The expansion of the forest beetle population has killed millions of hectares of trees across the United States and Canada and resulted in millions of dollars lost from decreased timber and tourism revenues.¹⁶⁵
45. Agriculture is extremely susceptible to climate changes, and higher temperatures generally reduce yields of desirable crops while promoting pest and weed¹⁶⁶ proliferation.¹⁶⁷ Global climate change is predicted to decrease crop yields, increase crop prices, decrease worldwide calorie availability, and by 2050 increase child malnutrition by 20%.¹⁶⁸ Climate change threatens global food security, meaning that any effort to mitigate global

¹⁵⁸ USGCRP, *Global Climate Change Impacts* at 84, 151-52.

¹⁵⁹ *See id.*

¹⁶⁰ *Id.* at 84.

¹⁶¹ *Id.* at 84-85.

¹⁶² USGCRP, *Global Climate Change Impacts* at 126; *See* United States Department of State (USDS), *U.S. Climate Action Report 2010, Fifth National Communication of the United States of America Under the United Nations Framework Convention on Climate Change* [hereinafter *U.S. Climate Action Report*] 87 (June 2010) available at <http://www.state.gov/documents/organization/140636.pdf>.

¹⁶³ *Id.*

¹⁶⁴ Subcomm. on Glob. Change Res., U.S. Climate Change Sci. Program, *Weather and Climate Extreme in a Changing Climate, Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands* [hereinafter *Weather and Climate Extremes*], IN SYNTHESIS AND ASSESSMENT PRODUCT 3.3 15 (T. R. Karl et al. eds., 2008), <https://www.climatecommunication.org/wp-content/uploads/2012/01/climateextremes.pdf>.

¹⁶⁵ *Id.*

¹⁶⁶ P. Blacklund et al., Subcomm. on Glob. Change Res., U.S. Climate Change Sci. Program, USCCSP & USDA, *The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States*, in *Synthesis and Assessment Product 4.3* (2008) at 59, https://www.cio.noaa.gov/services_programs/prplans/pdfs/ID194_Final_Peer_Review_Report.pdf (“Many weeds respond more positively to increasing CO₂ than most cash crops, . . . Recent research also suggests that glyphosate, the most widely used herbicide in the United States, loses its efficacy on weeds grown at CO₂ levels that likely will occur in the coming decades.”) available at https://www.usda.gov/oce/climate_change/SAP4_3/CCSPFinalReport.pdf

¹⁶⁷ G. C. Nelson et al., Int’l Food Pol’y Res. Inst., *Food Policy Report: Climate Change- Impacts on Agriculture and Costs of Adaptation* (2009) at vii.

¹⁶⁸ *Id.*

warming is effectively promoting a secure food supply.¹⁶⁹

46. Glacial and ice cap melting is one of the major causes of global sea level change.¹⁷⁰ When glaciers and ice caps melt, this adds water to the ocean.¹⁷¹ Additionally, as ocean water warms, it expands and takes up more space. Ocean warming “has been observed in each of the world’s major ocean basins, and has been directly linked to human influences.”¹⁷²
47. Human-caused fossil fuel burning and the resulting climate change are already contributing to an increase in asthma, cancer, cardiovascular disease, stroke, heat-related morbidity and mortality, food-borne diseases, and neurological diseases and disorders.¹⁷³ The World Health Organization has concluded, “the health effects of a rapidly changing climate are likely to be overwhelmingly negative”.¹⁷⁴ Climate change is expected to affect not only the basic requirements for maintaining health (clean air and water, sufficient food, and adequate shelter) but is likely to present new challenges for controlling infectious disease and even “halt or reverse the progress that the global public health community is now making against many of these diseases.”¹⁷⁵
48. As the 2010 Russian summer heat wave graphically demonstrated, heat can destroy crops, trigger wildfires, exacerbate air pollution, and cause increased illness and deaths.¹⁷⁶ Similar impacts are occurring across the United States: the “number and frequency of forest fires and insect outbreaks are increasing in the interior West, the Southwest, and Alaska. Precipitation, streamflow, and stream temperatures are increasing in most of the continental United States. The western United States is experiencing reduced snowpack and earlier peaks in spring runoff. The growth of many crops and weeds is being stimulated. Migration of plant and animal species is changing the composition and structure of arid, polar, aquatic, coastal, and other ecosystems.”¹⁷⁷ Up to 30% of the millions of species on our planet could go extinct following just a few tenths of a degree

¹⁶⁹ *Id.* at ix (“Climate change will pose huge challenges to food-security efforts. Hence, any activity that supports agricultural adaptation also enhances food security.”).

¹⁷⁰ M. Sharp et al., *Mountain Glaciers and Ice Caps (Outside Greenland)*, in ARCTIC REPORT CARD 2010 at 107 (2010) available at

https://www.cio.noaa.gov/services_programs/prplans/pdfs/ID194_Final_Peer_Review_Report.pdf.

¹⁷¹ USGCRP, *Global Climate Change Impacts supra* note 2 at 18.

¹⁷² *Id.*

¹⁷³ See Ctr. for Health and the Glob. Env’t, Harv. Med. Sch., *Climate Change Futures: Health, Ecological, and Economic Dimensions* (November 2005) available at eetd.lbl.gov/emills/pubs/pdf/climate-change-futures.pdf; see also USGCRP, *Global Climate Change Impacts supra* note 2 at 96-8.

¹⁷⁴ WHO, *Climate Change and Health* (2018), available at <http://www.who.int/news-room/fact-sheets/detail/climate-change-and-health>.

¹⁷⁵ WHO, *Protecting Health from Climate Change: Connecting Science, Policy, and People* (2009) at 2, available at <http://www.who.int/globalchange/publications/reports/9789241598880/en/index.html>.

¹⁷⁶ R.M. Dole et al, *Was There a Basis for Anticipating the 2010 Russian Heat Wave?* GEOPHYS. RES. LETT., VOL.38(6) (Am. Geophys. Assoc. eds. 2011).

¹⁷⁷ EPA, *Terminology Services Document* at 41.

warming above present.¹⁷⁸ Large wildfires in the Western US have quadrupled in recent years, a result of hotter temperatures and earlier snowmelt that contributes to dryer soils and vegetation.¹⁷⁹

49. Similarly, climate change is already causing, and will continue to result in, more frequent, extreme, and costly weather events (such as hurricanes).¹⁸⁰ The annual number of major tropical storms and hurricanes has increased over the past 100 years in North America, coinciding with increasing temperatures in the Atlantic sea surface.¹⁸¹
50. The changing climate also raises national security concerns, as “climate change will add to tensions even in stable regions of the world.”¹⁸² The United States may experience an additional need to accept immigrant and refugee populations as droughts increase and food production declines in other countries.¹⁸³ Increased extreme weather events (such as hurricanes) will also present an increased strain on foreign aid and call for military forces.¹⁸⁴ For instance, by 2025, 40% of the world’s population will be living in countries experiencing significant water shortages, while sea-level rise could cause displacement of tens, or even hundreds, of millions of people.¹⁸⁵
51. Paleoclimate data provides sobering evidence that major climate change can occur over mere decades, and that the consequences would be much more severe, and even disastrous, if a 2°C (3.6°F) change occurs over decades rather than hundreds of years.¹⁸⁶
52. There are at least three reasons that the present, human-induced global warming is particularly significant. First, past global warming and cooling of a similar magnitude occurred before human civilization existed.¹⁸⁷ Second, global warming is happening far more rapidly than in past occurrences¹⁸⁸, giving both humans and other forms of life only a short time to adapt to the changes. Human civilization and the crops and foods on which

¹⁷⁸ IPCC, *AR4, Working Group II: Impacts, Adaptation and Vulnerability- Magnitudes of Impact*, available (2007) at http://www.ipcc.ch/publications_and_data/ar4/wg2/en/spmssp-c-15-magnitudes-of.html.

¹⁷⁹ *Global Climate Change Impacts supra* note 2 at 95.

¹⁸⁰ *Id.* at 27 (“Many types of extreme weather events, such as heat waves and regional droughts, have become more frequent and intense during the past 40 to 50 years.”).

¹⁸¹ *Scientific Assessment supra* note 27 at 7.

¹⁸² The CNA Corporation, Mil. Advisory Bd., *National Security and the Threat of Climate Change* (2007) at 7, available at http://securityandclimate.cna.org/report/SecurityandClimate_Final.pdf.

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Id.* at 16.

¹⁸⁶ See J.E. Hansen & M. Sato, *Paleoclimate Implications for Human-Made Climate Change in Climate Change: Inferences from Paleoclimate and Regional Aspects*, (Springer eds., 2012) at 21-48, available at http://www.columbia.edu/~jeh1/mailings/2011/20110118_MilankovicPaper.pdf.

¹⁸⁷ See J.E. Hansen et al., *Target Atmospheric CO₂: Where Should Humanity Aim?*, OPEN ATMOS. SCI. 217, 217-231 (2008).

¹⁸⁸ *Id.*

it depends have developed within a very narrow set of climatic conditions.¹⁸⁹ With the human population so large, with civilization so complex, centered around coastal cities, and dependent on water supplies fed by distant ice and snow melt, and with the great disparities in wealth between and within countries and regions, it will be nearly impossible adequately to adapt to all of the climate change impacts in the relatively short time-frame in which they will occur.¹⁹⁰ The deadliest fire in California history, the Camp Fire, has been exacerbated by drought and wind conditions associated with climate change.¹⁹¹

53. Third, and perhaps most importantly, the climate change we are now experiencing is caused largely by human activity.¹⁹² This means that, unlike with respect to past climate change events, by changing our activities, humans can limit increases in greenhouse gas pollution and the resulting climate disruption.¹⁹³ Stopping, or at least greatly curtailing, the activities that discharge greenhouse gases into the air, such as the burning of fossil fuels, and encouraging activities that remove CO₂ from the atmosphere, can greatly reduce and even end global warming and its accompanying consequences within the lifetimes of today's children.¹⁹⁴
54. To protect Earth's climate for present and future generations, we must restore Earth's energy balance. The best available science shows that if the planet once again sends as much energy into space as it absorbs from the sun, this will restore the planet's climate equilibrium.¹⁹⁵ Scientists have accurately calculated how Earth's energy balance will change if we reduce long-lived greenhouse gases such as carbon dioxide.¹⁹⁶ Humans have

¹⁸⁹ J. Abatzoglou et al., *A Primer on Global Climate Change and Its Likely Impacts* 15, in CLIMATE CHANGE: WHAT IT MEANS FOR US, OUR CHILDREN, AND OUR GRANDCHILDREN (Joseph F. DiMento & Pamela Doughman eds., MIT Press 2007).

¹⁹⁰ See generally U.S. Agency Int'l Dev. (USAID), *Adapting to Climate Variability and Change: A Guidance Manual for Development Planning* (2007) (discussing difficulty of adapting to climate change), available at http://pdf.usaid.gov/pdf_docs/PNADJ990.pdf; see also *Global Climate Change Impacts*, *supra* note 2 at 12 ("Climate change will combine with pollution, population growth, overuse of resources, urbanization, and other social, economic, and environmental stresses to create larger impacts than from any of these factors alone.").

¹⁹¹ Matt Simon, *The Terrifying Science Behind California's Massive Camp Fire*, *Wired* (Nov. 9, 2018), available at <https://www.wired.com/story/the-terrifying-science-behind-californias-massive-camp-fire/>.

¹⁹² See *Global Climate Change Impacts*, *supra* note 2 at 20; see also EPA, *TS Endangerment Findings* 47-51; IPCC, *AR4* at 39.

¹⁹³ *Global Climate Change Impacts*, *supra* note 2 at 107 ("By mid-century and beyond, however, today's emissions choices would generate starkly different climate futures: the lower the emissions, the smaller the climatic changes and resulting impacts.").

¹⁹⁴ *Id.* at 12 ("Future climate change and its impacts depend on choices made today.").

¹⁹⁵ J. Abatzoglou et al., *supra* note 190, at 15-22.

¹⁹⁶ J. Hansen, *STORMS OF MY GRANDCHILDREN: THE TRUTH ABOUT THE COMING CLIMATE CATASTROPHE AND OUR LAST CHANCE TO SAVE HUMANITY* 166 (Bloomsbury USA eds. 2009) ("Also our best current estimate for the planet's mean energy imbalance over the past decade, thus averaged over the solar cycle, is about +0.5 watt per square meter. Reducing carbon dioxide to 350 ppm would increase emission to space 0.5 watt per square meter, restoring the planet's energy balance, to first approximation.").

altered Earth's energy balance¹⁹⁷ and are currently causing a planetary energy imbalance of approximately one-half watt.¹⁹⁸ We would need to reduce atmospheric carbon dioxide concentrations by about 40 ppm, in order to increase Earth's heat radiation into space by one-half watt, if other long-lived gases stay the same as today.¹⁹⁹ We must reduce atmospheric carbon dioxide concentration to 350 ppm to avoid the threats contained herein.²⁰⁰

55. In a statement by the 21 Academies of Sciences of British Commonwealth, those Academies stated:

“The world's climate is changing, and the impacts are already being observed. Changing agricultural conditions, ocean warming and acidification, rising sea levels, and increased frequency and intensity of many extreme weather events are impacting infrastructure, environmental assets and human health.

Impacts such as higher rainfall and increased plant growth will be beneficial in some cases.

However, others will be detrimental and felt more widely, changing ecosystems and weather patterns, and disrupting industries, economies, food supplies and livelihoods.

The consensus view of the global climate science community based on current evidence is that avoiding the worst impacts of climate change will require concerted global action to reduce atmospheric carbon.

A target to limit warming to below 2°C above pre-industrial levels was recognized by 160 nations that ratified the 2015 Paris Agreement on Climate Change; a bold and vital step towards addressing climate change.

Meeting this target will require achieving net-zero global greenhouse gas emissions in the second half of the Century followed by active decarbonisation of the atmosphere.

Our work towards this objective has only just begun.

Even if all countries meet their current commitments to greenhouse gas emission reductions, a global temperature rise of more than 3°C above pre-industrial levels is projected by 2100 according to current data.

¹⁹⁷ IPCC, *AR4* at 37 (“[T]he global average net effect of human activities since 1750 has been one of warming, with a radiative forcing of +1.6 [+0.6 to +2.4] W/m².”).

¹⁹⁸ D.M. Murphy et al., *An observationally based energy balance for the Earth since 1950* 114 J. Geophysical Res. Letters D17107 (2009).

¹⁹⁹ J. Hansen *supra* note 196 at 166; *see also* J. Hansen et al., *Target Atmospheric CO₂: Where Should Humanity Aim?*, 2 OPEN ATMOS. SCI. 217, 217-231 (2008).

²⁰⁰ *Id.* at 217 (“If humanity wishes to preserve a planet similar to that on which civilization developed and to which life on Earth is adapted, Paleoclimate evidence and ongoing climate change suggest that CO₂ will need to be reduced from its current 385 ppm to at most 350 ppm.”).

This would lead to profound impacts affecting billions of people throughout the world.

This challenge needs to be addressed now, and the efforts required will bring enduring social, environmental and economic benefits and opportunities.”²⁰¹

56. The best available science also shows that to protect Earth’s natural systems, average global surface heating must not exceed 1° C this century.²⁰² To prevent global heating greater than 1° C, concentrations of atmospheric CO₂ must decline to less than 350 ppm this century.²⁰³ However, today’s atmospheric CO₂ levels are about 408 ppm²⁰⁴ and are rising.
57. Atmospheric CO₂ levels are currently on a path to reach a climatic tipping point.²⁰⁵ Absent immediate action to reduce CO₂ emissions, atmospheric CO₂ may reach levels as high as about 1000 ppm²⁰⁶ and a temperature increase of up to 5° C by 2100.²⁰⁷ Life on Earth as we know it, is unsustainable at these levels.
58. The Board has the present ability to curtail the environmental harms detailed above. Atmospheric CO₂ concentrations will decrease if people stop (or greatly reduce) their burning of fossil fuels.²⁰⁸ The environmental harms and threat to human health and safety as described above can be avoided only if atmospheric CO₂ concentrations are immediately reduced. Any more delay risks irreversible and unacceptable consequences for youth and future generations.
59. Fossil fuel emissions must decrease rapidly if atmospheric CO₂ is to be returned to a safe level in this century.²⁰⁹ Improved forestry and agricultural practices can provide a net drawdown of atmospheric CO₂, primarily via reforestation of degraded lands that are of little or no value for agricultural purposes, returning us to 350 ppm somewhat sooner.²¹⁰

²⁰¹ Commonwealth Acads. Of Sci. Consensus Statement on Climate Change (2018), *available at* <https://royalsociety.org/~media/news/2018/commonwealth-academies-consensus-statement-on-climate-change-12-march-2018.pdf>.

²⁰² See J.E. Hansen & M. Sato, *supra* note 187; See also IPCC, *AR4* at 48 (“For increases in global average temperature exceeding 1.5 to 2.5°C and in concomitant atmospheric CO₂ concentrations, there are projected to be major changes in ecosystem structure and function, species’ ecological interactions and shifts in species’ geographical ranges, with predominantly negative consequences for biodiversity and ecosystem goods and services, e.g. water and food supply.”).

²⁰³ See J. Hansen et al., *supra* note 196 at 217.

²⁰⁴ *Atmospheric CO₂ for March 2011*, CO₂NOW, <http://co2now.org/> (last visited November 17, 2018).

²⁰⁵ J. Hansen, *supra* note 196 at 260.

²⁰⁶ IPCC, *AR4* at 66-7.

²⁰⁷ IPCC, *AR4* at 46.

²⁰⁸ HARVEY BLATT, *AMERICA’S ENVIRONMENTAL REPORT CARD – ARE WE MAKING THE GRADE?* xiii (MIT Press 2d ed. 2011) (“How can we stop this change in our climate? The answer is clear. Stop burning coal and oil, the sources of nearly all the carbon dioxide increase.”).

²⁰⁹ See J. Hansen et al., *supra* note 197 at 217 (discussing the need to reduce atmospheric carbon dioxide concentration to 350 ppm).

²¹⁰ *Id.* at 227.

However, the potential of these measures is limited. Immediate and substantial reductions in carbon dioxide emissions are required in order to conserve Pennsylvania’s public natural resources and to ensure that the youth and future generations of children inherit a planet that is habitable.²¹¹

60. Because most fossil fuel CO₂ emissions will remain in the surface carbon reservoirs for millennia, it is imperative that fossil fuel CO₂ emissions be rapidly terminated. Global CO₂ emissions must be reduced by 45% from 2010 levels by 2030 and must reach net neutrality by “around 2050.”²¹² The failure to act promptly will not only increase the costs of future reductions, it will have irreversible adverse effects on the youth and all future generations, as detailed above.
61. There are more than 1,000 legal and policy tools that can be used to achieve the deep decarbonization necessary to conserve Pennsylvania’s public natural resources. An economy-wide GHG auction-cap-and-trade program with a cap declining to zero is a fundamental aspect of many of those. Without a uniform cap, intersectoral leakage that will undermine the effectiveness of other programs will be inevitable.²¹³
62. Since 1970, annual average temperatures in the Northeast region of the United States have increased by 2 degrees (Fahrenheit) in the summer, and by twice as much in the winter. Temperatures are expected to continue warming, with projected additional increases of approximately 3 degrees in the spring and 4 degrees in the summer, fall and winter months by the middle of the current century.²¹⁴
63. By the end of the current century, without significant world-wide decreases in carbon dioxide emissions, it is projected that summer temperatures in the northeastern U.S. could rise by as much as 6-14 degrees above historic averages, and as much as 8-12 degrees in the winter.²¹⁵
64. Temperatures in Harrisburg, Pennsylvania have increased 1.2 degrees in the last century, and precipitation has increased as much as 20% in many parts of the Commonwealth. In the next century, it is predicted that temperature at this location will increase a further 4

²¹¹ *IPCC 2018 Report*

²¹² *Id.* at 14; Hansen *et al.*, at 211.

²¹³ Michael B. Gerrard & John C. Dernbach eds., *Legal Pathways to Deep Decarbonization in the United States* (ELI 2018).

²¹⁴ See U.S. Glob. Change Res. Program, *Global Climate Change Impacts on the United States: Regional Climate Impacts on the Northeast* (Washington, D.C., 2000) (“*Climate Change Impacts*”); Northeast Climate Impacts Synthesis Team, Union of Concerned Scientists, *Confronting Climate Change in the United States: Northeast Science, Impacts and Solutions* (2007), available at https://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/pdf/confronting-climate-change-in-the-u-s-northeast.pdf.

²¹⁵ See Northeast Climate Impacts Synthesis Team, *supra* note 215; Union of Concerned Scientists, *Climate Change in Pennsylvania: Impacts and Solutions in the Keystone State* (2008), available at https://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/Climate-Change-in-Pennsylvania_Impacts-and-Solutions.pdf.

degrees, with seasonal increases in precipitation between 10-50%.²¹⁶

65. An increase in frequency of summer temperatures exceeding “extreme heat” (conditions of over 90 degrees) is expected as a result of continued climate change. By the year 2050, it is estimated that southern and eastern Pennsylvania will receive as many as 50 days per year exceeding 90 degrees, and as many as 70 days per year by the end of the century.²¹⁷
66. The number of days below 32 degrees (freezing) is expected to decrease by half in the next several decades and disappear in all but the highest altitudes of Pennsylvania by the end of the current century.²¹⁸
67. It is predicted that warming will lead to an increased growing season in the northeast United States. This resulting lengthening will cause spring to begin three weeks earlier and winter to arrive three weeks later by the end of the current century.²¹⁹
68. Precipitation has increased by 10% in the last century, and further increases in precipitation by an additional 10-30% are expected within the next century.²²⁰
69. As average winter temperatures increase, more precipitation will fall in the form of rain instead of snow, which will reduce snowpack and increase the likelihood of flooding during the winter and spring months.²²¹
70. In general, the amount of rainfall received during extremely wet days of the summer and fall months is expected to increase. It is also expected that an increase in the frequency and intensity of summer thunderstorms may occur.²²²
71. Increases in winter and spring precipitation (combined with the early melting of snowpack) are expected to shift the timing of peak surface water flows earlier in the spring and cause low-flows in the late summer and early fall. This is of special concern for the tributaries to the Ohio River, where peak flows in the spring are expected to arrive several

²¹⁶ See EPA, Office of Pol’y, Plan., and Evaluation, *Climate Change and Pennsylvania*, Pub. No. 230-F-97-00811 (1997) (“*Climate Change and Pennsylvania*”); Ctr. for Integrative Env’tl. Res., U. Md., *Economic Impacts of Climate Change on Pennsylvania* (2008) available at <http://40w95614sn5m1jd0sb353zli.wpengine.netdna-cdn.com/pittsburgh/files/2016/12/Pennsylvania-Economic-Impacts-of-Climate-Change-Full-Report.pdf>; Ctr. for Health and the Global Env’t., Harv. Med. Sch., *Climate Change and Health in Pennsylvania* (2011).

²¹⁷ See U.S. Glob. Change Res. Program, *Climate Change Impacts*, *supra*; Northeast Climate Impacts Synthesis Team, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*; Union of Concerned Scientists, *supra*.

²¹⁸ Union of Concerned Scientists, *supra* note 215; Ctr. for Health and the Global Env’t., *supra* note 217.

²¹⁹ See U.S. Glob. Change Res. Program, *Climate Change Impacts*, *supra*; Northeast Climate Impacts Synthesis Team, *supra*.

²²⁰ See USGCRP, *Global Climate Change Impacts*, *supra*; Union of Concerned Scientists, *supra*; Ctr. for Integrative Env’tl. Res., *supra*.

²²¹ See USGCRP, *Global Climate Change Impacts*, *supra*; Northeast Climate Impacts Synthesis Team, *supra*; Ctr. for Integrative Env’tl. Res., *supra*.

²²² See EPA, *Climate Change and Pennsylvania*, *supra*; Ctr. for Integrative Env’tl. Res., *supra*.

weeks earlier with a 4-degree increase in average annual temperature.²²³

72. Climate change and winter warming are correlated with the earlier break-up of ice on lakes and rivers, which increases the influx of early spring waters into surface flows.²²⁴
73. Groundwater recharge could be adversely affected by declines in groundwater supply during the late summer and early fall. Precipitation events during these months are expected to be intense, but with greater length of time between events.²²⁵
74. Some of the most extreme flood events on record in the United States occurred in Pennsylvania. Increases in winter and spring runoff are expected to increase the incidence of flooding. Flood events may also increase the amount of pollution, erosion, and nutrient inputs moving from urban, agricultural, and industrial lands, into wetland ecosystems.²²⁶
75. Warmer ambient temperatures will warm surface and groundwater supplies, potentially compromising the quality of these resources.²²⁷
76. The increased frequency and intensity of flooding, drought, wildfires and invasion of non-native plant species are all anticipated to cause, and accelerate, a rapid transformation of Pennsylvania's current landscape and its ecosystems.²²⁸
77. A significant increase in summer drying is expected to change tree species composition in forested regions of the Commonwealth and lead to an overall decrease in forested land. With warmer conditions, it is also expected that forested lands will shift northward, and grasslands and pasture will replace many forested areas. A 15-20% overall loss of forestlands is projected.²²⁹ This will have particularly adverse impacts on the Allegheny plateau, which currently produces 80% of the world's cherry supply, and which will be converted from a Maple-Beech-Birch forest type to Oak Hickory.²³⁰
78. A change in climate can increase the occurrence of wildfires by increasing drought

²²³ See USGCRP, *Global Climate Change Impacts*, *supra*; Northeast Climate Impacts Synthesis Team, *supra*; Pa. Dep't. of Env'tl. Protection, *Pennsylvania Climate Adaptation Planning Report: Risks and Practical Recommendations* (2014) ("*Pennsylvania Climate Adaptation*"), available at <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=6636&DocName=2700-RE-DEP4303%20Combined.pdf>; EPA, *Climate Change and Pennsylvania* *supra* note.

²²⁴ See Northeast Climate Impacts Synthesis Team, *supra*.

²²⁵ See Pa. Dep't. of Env'tl. Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*; Union of Concerned Scientists, *supra*.

²²⁶ See USGCRP, *Global Climate Change Impacts* *supra*; Pa. Dep't. of Env'tl Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*; Union of Concerned Scientists, *supra*; Ctr. for Integrative Env'tl. Res., *supra*.

²²⁷ See Pa. Dep't. of Env'tl Protection, *Pennsylvania Climate Adaptation*, *supra*.

²²⁸ See Pa. Dep't. of Env'tl Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*.

²²⁹ See Northeast Climate Impacts Synthesis Team, *supra*; Pa. Dep't. of Env'tl Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*.

²³⁰ USGCRP, *Global Climate Change Impacts*, *supra* at 81

conditions, increasing insect pest and disease pressure with a longer growing season, and also cause tree-community shifts to accommodate more fire-prone species. Increased wildfire events will increase the rate at which invasive plant species will be able to encroach on forested lands.²³¹

79. Initial increases in forest growth may be observed in response to elevated levels of atmospheric CO₂, but, within a short amount of time, forests will begin to be adversely affected by high amounts of ground-level ozone. Ground-level ozone is damaging to trees and plants.²³²
80. With forest habitat losses, it is expected that the area's Bald Eagles will also face decline, as they migrate north with shifting climate patterns and resources. This event is predicted to coincide with a 25% overall decline in the biodiversity of bird species.²³³
81. The Pocono Mountains, the Allegheny plateau, the Two Mile Run wetlands, and Pennsylvania forests are home to many rare and valuable species of trees and wildlife, as well as thousands of acres of public wilderness. The flora and fauna could have difficulty adapting to climate change, and with only a few corridors allowing for migration, it is possible that there could be a significant reduction in biodiversity, causing local extinctions.²³⁴
82. With lengthened growing seasons and warmer temperatures, the growth, reproductive capability, and geographical range of forest insect pests, such as the Hemlock Woolly Adelgid, will all be increased.²³⁵
83. The Erie National Wildlife Refuge provides aquatic resources vital to the preservation of approximately 70 species of fish and 25 species of freshwater mussels, many of which are already endangered. Further pressure to this ecosystem from climate change puts the aquatic wildlife at increased risk for extirpation.²³⁶
84. Brook trout and other coldwater fish are expected to decline in population due to warmer water temperatures in the rivers and lakes of Pennsylvania.²³⁷
85. Invasive plant and wildlife species better adapted to hotter and drier conditions (like those predicted by climate change models) have a higher chance of successfully overtaking native species (which are expected to experience decreases in geographic range due to

²³¹ See *id.*

²³² See EPA, *Climate Change and Pennsylvania*, *supra*; Ctr. For Integrative Envtl. Res., *supra*; Ctr. For Health and the Global Env't., *supra*.

²³³ See EPA, *Climate Change and Pennsylvania*, *supra*.

²³⁴ See Pa. Dep't. of Envtl. Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*.

²³⁵ See Northeast Climate Impacts Synthesis Team, *supra*; Pa. Dep't. of Envtl. Protection, *Pennsylvania Climate Adaptation*, *supra*; Union of Concerned Scientists, *supra*.

²³⁶ See EPA, *Climate Change and Pennsylvania* *supra*.

²³⁷ See Union of Concerned Scientists, *supra*.

stress from climate change). These stresses include seasonal drying of wetland habitat, increase in the frequency and severity of extreme weather events, and changes in atmospheric chemical composition.²³⁸

86. Heat waves are predicted to become much more common, which will pose increased risks to human health. An increase in average temperatures is expected to increase the number of heat related illnesses and deaths, especially in cities. One study has predicted that the number of heat related deaths could increase by as much as 90% by the year 2050, increasing from 130 per year to over 240.²³⁹
87. Increased flooding is of high concern, as the increase in the frequency and magnitude of flooding events will increase the incidence of related morbidity and mortality.²⁴⁰
88. Increased emissions combined with higher temperatures will cause an increase in levels of ground-level ozone. Ozone is a toxic component of smog with the potential to cause serious long-term and permanent damage to lung tissues with repeated exposure. A 4-degree increase in average temperature near Pittsburgh could increase concentration of ground-level ozone by 8%.²⁴¹
89. Increases in temperature and humidity levels (thought to increase mold) can aggravate symptoms of respiratory allergies and asthma by stimulating plant pollen production. This problem will be further exacerbated by high availability of atmospheric CO₂, which is also predicted to stimulate plant growth early in the season.²⁴²
90. Due to “Island Heat” effects in urban areas, the effects of climate change will be much more extreme in cities, which may be as much as 7-10 degrees warmer than surrounding suburban areas.²⁴³
91. With milder, shorter winters and longer growing seasons, insects and other disease vectors are expected to increase. Risk of increase in West Nile Virus, malaria, and dengue transmission are all of special concern.²⁴⁴

²³⁸ See Pa. Dep’t. of Env’tl. Protection, *Pennsylvania Climate Adaptation supra*.

²³⁹ See U.S. Glob. Change Res. Program, *Climate Change Impacts supra*; Pa. Dep’t. of Env’tl. Protection, *supra* note 224; EPA, *Climate Change and Pennsylvania, supra*; Union of Concerned Scientists, *supra*; Ctr. For Health and the Global Env’t., *supra*.

²⁴⁰ See Pa. Dep’t. of Env’tl. Protection, *Pennsylvania Climate Adaptation, supra*; Ctr. For Integrative Env’tl. Res., *supra*.

²⁴¹ See U.S. Glob. Change Res. Program, *supra*; EPA, *Climate Change and Pennsylvania, supra*; Union of Concerned Scientists, *supra*; Ctr. For Health and the Global Env’t., *supra*.

²⁴² See Pa. Dep’t. of Env’tl. Protection, *Pennsylvania Climate Adaptation, supra*; EPA, *Climate Change and Pennsylvania, supra*; Union of Concerned Scientists, *supra*; Ctr. For Integrative Env’tl. Res., *supra*; Ctr. For Health and the Global Env’t., *supra*.

²⁴³ See U.S. Glob. Change Res. Program, *Climate Change Impacts supra*; Ctr. For Health and the Global Env’t., *supra*.

²⁴⁴ See Northeast Climate Impacts Synthesis Team, *supra* note 215; Pa. Dep’t. of Env’tl. Protection, *supra* note 224; EPA, *Climate Change and Pennsylvania supra*; Union of Concerned Scientists, *supra*; Ctr. For Health and the Global Env’t., *supra*.

92. Many waterborne diseases (such as cholera) thrive in warm water conditions and will present an increased risk to public health as temperatures and flood frequency both increase. There is also increased risk of sewage and septic system overflows during times of flooding.²⁴⁵
93. Warmer temperatures and increased seasonal precipitation could increase low-lying vegetation. This may lead to an increase in the population of ticks (and their rodent hosts) possibly carrying Lyme's and other tick-borne diseases.²⁴⁶
94. Changes to forest tree species include shifts from the current maple-dominated community composition to a community dominated by species better adapted to warmer climates, such as pines and oak. The additional risk from more frequent and severe forest fires will increase as the region experiences a hotter and drier climate. An overall loss of forested lands between 15-25% is projected by the end of the current century.²⁴⁷
95. Climate changes and a shift in plant and animal communities will lead to a loss of wildlife and habitat. This reality threatens the \$181 million annual industry that is received by the state in the form of hunting, fishing, and wildlife-viewing tourism.²⁴⁸
96. Agricultural crop yields are heavily reliant on temperature, moisture and day-to-day weather. They are also especially vulnerable to climate change. Major, regional shifts are expected to occur, and it will be difficult to maintain current production rates, and quality, of food commodities. It is predicted that crop production will shift northward, which will make adaptation for farmers difficult.²⁴⁹
97. Milder winters increase the likelihood that weeds (such as kudzu), pests, and pathogens, previously unable to survive lower temperatures will be able to successfully invade. This will lead to increased costs for pest control and is likely to result in other costly damages.²⁵⁰
98. Overall crop yield for hay and corn is expected to decrease by as much as 39% by the year 2100, leading to large changes in the number of acres farmed and the subsequent production rates.²⁵¹

²⁴⁵ See U.S. Glob. Change Res. Program, *Climate Change Impacts*, *supra*; Pa. Dep't. of Env'tl. Protection, *Pennsylvania Climate Adaptation*, *supra*; Union of Concerned Scientists, *supra*; Ctr. For Integrative Env'tl. Res., *supra*.

²⁴⁶ See Pa. Dep't of Env'tl. Protection, *Pennsylvania Climate Adaptation*, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*; Ctr. For Health and the Global Env't, *supra* note 215.

²⁴⁷ See U.S. Glob. Change Res. Program, *Climate Change Impacts*, *supra*; Northeast Climate Impacts Synthesis Team, *supra*; EPA, *Climate Change and Pennsylvania*, *supra*; Union of Concerned Scientists, *supra*.

²⁴⁸ See Ctr. For Integrative Env'tl. Res., *supra* note 217.

²⁴⁹ See U.S. Glob. Change Res. Program, *Climate Change Impacts* *supra*.

²⁵⁰ See Northeast Climate Impacts Synthesis Team, *supra*.

²⁵¹ See EPA, *Climate Change and Pennsylvania*, *supra*; Ctr. For Integrative Env'tl. Res., *supra*.

99. As winters become milder, the number of freezing days available for certain crops (such as Concord grapes) will be more infrequent, with an estimated projection of harvests only every other year by 2050, and only 3 out of every 5 years by the end of the century. Apple orchards will also decline in yield with decreased winter freezing.²⁵²
100. Livestock production is expected to decline as the cost of feed and ventilation for indoor animals increases, and as decreased crop production is expected to limit forage resources. Increased temperatures may also cause direct stress to animals, causing decreases in growth and a projected 20% or more decrease in milk production.²⁵³
101. Increasing precipitation received during downpours is expected to increase flooding, increase damages to infrastructure, and cause human health problems. This is especially so in cities, where heavy rains can overwhelm drainage systems and water treatment facilities, increasing the likelihood of waterborne diseases and therefore increasing associated health care costs.²⁵⁴
102. Increased flooding poses a serious risk to transportation agencies. More frequent and severe storm events coupled with flooding and structural failures resulting from high-heat conditions are expected to cause damage to roadways, bridges, railways, and other utility systems.²⁵⁵
103. Decreased water levels could cause several economic issues for all of the states bordering the Great Lakes. Low water levels lead to a decrease in depth of navigation channels and will cause damage to vessels and increase repair expenses, as well as require the rebuilding of docks and harbors. These transformations are expected to require between \$85 and \$142 million dollars annually.²⁵⁶
104. If the Commonwealth of Pennsylvania had begun reducing carbon emissions in 2005, it would have done its part by protecting a stable livable atmosphere by 2100 with only a 3% annual reduction in emissions. Because we have waited, reaching a safe atmosphere by the end of the century will require a 6% annual reduction in emissions beginning in 2013. If we delay until 2020 to reduce our greenhouse gas emissions we would have to reduce emissions by 15% every year until the end of this century to ensure a livable atmosphere

²⁵² See Union of Concerned Scientists, *supra*.

²⁵³ See U.S. Glob. Change Res. Program, *Climate Change Impacts supra*; Northeast Climate Impacts Synthesis Team, *supra*; Union of Concerned Scientists, *supra*; Ctr. For Health and the Global Env't., *supra*.

²⁵⁴ See U.S. Glob. Change Res. Program, *Climate Change Impacts supra*; Northeast Climate Impacts Synthesis Team, *supra*; Pa. Dep't. of Env'tl. Protection, *Pennsylvania Climate Adaptation, supra*; EPA, *Climate Change and Pennsylvania, supra*; Ctr. for Integrative Env'tl. Res., *supra*.

²⁵⁵ See U.S. Glob. Change Res. Program, *Climate Change Impacts supra*; Pa. Dep't. of Env'tl. Protection, *Pennsylvania Climate Adaptation, supra*; Ctr. for Integrative Env'tl. Res., *supra*.

²⁵⁶ See Ctr. for Integrative Env'tl. Res., *supra*.

for our generation and those yet to come.²⁵⁷

105. According to DEP’s 2015 report on the impacts of climate change in Pennsylvania²⁵⁸, “Pennsylvania has undergone a long-term warming of more than 1°C (1.8°F) over the past 110 years.”²⁵⁹ That Report also projects an increase of about 3°C (5.4°F) between 2000 and 2050, which means that the “current warming trend is expected to continue at an accelerated rate.”²⁶⁰ It will be necessary to keep temperature increases well below 2°C and desirable to keep them below 1.5°C to prevent serious climate disruption.

106. This warming is, and will continue to be, accompanied by a parallel trend in increasing precipitation.²⁶¹ “The corresponding annual precipitation increase is expected to be 8%, with a winter increase of 14%.”²⁶² The report does not say—and could not say—that warming and precipitation trends will stabilize in 2050.²⁶³ It appears more likely that, absent significant efforts to reduce greenhouse gas emissions, these trends will continue to accelerate after 2050.

107. Climate change in Pennsylvania will increase air pollution:

Climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness. The linkage between climate change and air quality is most strongly established for ground-level ozone creation during summer, but there is some evidence that higher temperatures and higher precipitation will result in increased allergen (pollen and mold) levels as well.²⁶⁴

108. Climate change will also likely increase water pollution in Pennsylvania:

Climate change can potentially also worsen water quality, affecting health through drinking water and through contact during outdoor recreation. The two primary mechanisms through which climate change could affect surface water quality are (1) increased pathogen loads due to increased surface runoff from livestock farms, sewer overflows, and resuspension of pathogens in river sediments during heavy

²⁵⁷ J. Hansen et al., *Assessing “Dangerous Climate Change”: Required Reduction of Carbon Emissions to Protect Young People, Future Generations and Nature*, PLOS ONE, 8(12), (2013) <http://pubs.giss.nasa.gov/abs/ha08510t.html>. (“these scenarios assume a massive 100 GtC reforestation program”).

²⁵⁸ James Shortle, et al., *Pennsylvania Climate Impacts Assessment Update* (May 2015) (*PA Climate Impacts Update*). The report was required by the Pennsylvania Climate Change Act, 71 Pa. C.S. § 1361.3.

²⁵⁹ *Id.* at 6 (“Changes in Pennsylvania’s temperature are reflected in other metrics, such as heating degree days (which have increased) and cooling degree days (which have decreased).”).

²⁶⁰ *Id.* at 7.

²⁶¹ *PA Climate Impacts Update*, *supra* at 6-7.

²⁶² *Id.* at 7.

²⁶³ *See id.*

²⁶⁴ *Id.* at 11.

rainstorms, and (2) increased risk of harmful algal blooms in eutrophied lakes and reservoirs.²⁶⁵

109. Although there may be some beneficial impacts from these changes, the *Pennsylvania Climate Impacts Report* indicates that the adverse effects on Pennsylvania’s public natural resources will dwarf any positive impacts.²⁶⁶ Higher temperatures will stress the dairy industry and require increased energy use.²⁶⁷ It will also cause forest types to change, lead to increased mortality in the forests, and interfere with forest regeneration.²⁶⁸ Increased temperatures may increase the prevalence of vector-borne diseases.²⁶⁹ Climate change will have “a severe, negative impact on winter recreation,” so that “Pennsylvania’s downhill ski and snowboard resorts are not expected to remain economically viable past mid-century.”²⁷⁰ Some areas will no longer be able to support trout.²⁷¹ Flood risks will increase throughout the Commonwealth.²⁷² Moreover, sea level rise will affect the Delaware estuary, inundating some areas and causing an increase in salinity.²⁷³
110. Reports published since 2015 have determined that the adverse impacts of climate disruption on public natural resources will be more severe than those identified in the *Pennsylvania Climate Impacts Report*. One more recent report indicates that sea level rise due to melting glaciers will be more extensive, such that some parts of Tinicum National Wildlife Refuge and Philadelphia International Airport will be inundated before the end of the century.²⁷⁴
111. Adverse impacts on plants and wildlife will be particularly severe, even with the emissions reductions that will be achieved under the current pledges in the Paris Agreement on Climate Change.²⁷⁵ With the current pledges, temperatures would increase

²⁶⁵ *Id.* at 11, 14. In addition, “climate change will worsen the currently substandard water quality in the tidal freshwater region of the Delaware Estuary.”

²⁶⁶ *See id.*

²⁶⁷ *Id.* at 8.

²⁶⁸ *Id.* at 9-10.

²⁶⁹ *Id.* at 11.

²⁷⁰ *Id.*

²⁷¹ *Id.* at 12.

²⁷² *Id.*

²⁷³ *Id.* at 14.

²⁷⁴ A study published in 2018 based on 25 years of satellite data showed accelerated rates of sea level rise driven by the melting of the Greenland and Antarctic ice sheets and predicted that, if these rates continue, sea levels would rise by 65 centimeters, or 26 inches, by 2100 compared to past estimates. R. S. Nerem et al, *Climate-change–driven Accelerated Sea-Level rise Detected in the Altimeter Era*, 115 PROC. NAT’L ACADEMY SCIENCES 2022, 2022 (Feb. 2018), <https://doi.org/10.1073/pnas.1717312115>; The last IPCC assessment estimated that sea levels could rise from between 44 cm and 74 cm by 2100, approximately doubling sea level rise. John A. Church et al., IPCC, *Sea Level Change*, in *Climate Change 2013: The Physical Science Basis*, Chapter 13, at 1182, Table 13.5 (2013), <http://www.ipcc.ch/report/ar5/wg1/>. Because Tinicum marsh and the airport are located in tidal areas of the Delaware Estuary, significant portions would be inundated.

²⁷⁵ R. Warren et. al., *The Projected Effects on Insects, Vertebrates, and Plants of Limiting Global Warming to 1.5°C Rather Than 2°C*, 360 SCIENCE 791, 791 (May 18, 2018).

by approximated 3.2°C, reducing the ranges by more than 50% for approximately 49% of insect species, 44% of plant species and 26% of vertebrate species, dramatically increasing the risk of extinction.²⁷⁶ With greater reductions that would limit temperature increases to the Paris Agreement's goals of 2°C and 1.5°C, the damage will be substantially less.²⁷⁷ These species, of course, include species in Pennsylvania.

112. Impacts of climate disruption will not be evenly distributed. Low income and minority communities are likely to be more severely affected because of “lack of air conditioning, greater prevalence of pre-existing health conditions, location and condition of housing, inadequate access to transportation, relatively greater rates of under-insurance, and concentrations in strenuous occupations.”²⁷⁸ In addition, because climate change will likely increase the price of water, food, and even energy, it will also disproportionately affect households with lower incomes.²⁷⁹

113. EPA's *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States*²⁸⁰ continues the pattern of predicting greater and more imminent damage from climate disruption if action is not taken to reduce emissions commensurate with those called for by the draft regulation. It concluded that “Without substantial and sustained global mitigation and regional adaptation efforts, climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century,” as follows:

In the absence of significant global mitigation action and regional adaptation efforts, rising temperatures, sea level rise, and changes in extreme events are expected to increasingly disrupt and damage critical infrastructure and property, labor productivity, and the vitality of our communities. Regional economies and industries that depend on natural resources and favorable climate conditions, such as agriculture, tourism, and fisheries, are vulnerable to the growing impacts of climate change. Rising temperatures are projected to reduce the efficiency of power generation while increasing energy demands, resulting in higher electricity costs. The impacts of climate change beyond our borders are expected to increasingly affect our trade and economy, including import and export prices and U.S. businesses with overseas operations and supply chains. Some aspects of our economy may see slight near-term improvements in a modestly warmer world. However, the continued warming that is projected to occur without substantial and sustained reductions in global greenhouse gas emissions is expected to cause substantial net damage to the U.S. economy throughout this century, especially in the absence of increased adaptation efforts. With continued growth in emissions at

²⁷⁶ Id.

²⁷⁷ At 2°C these numbers fall to 18% of insects, 16% of plants, and 26% of vertebrates and at 1.5°C they fall further to 6% of insects, 8% of plants and 4% of vertebrates. Id.

²⁷⁸ Shelley Welton, *Clean Electrification*, 88 U. COLO. L. REV. 571, 627-28 (2017) (citing IPCC and other studies).

²⁷⁹ Id. at 628-29.

²⁸⁰ U.S. Global Change Research Program, *Fourth National Climate Assessment, Volume II: Impacts, Risks, and Adaptation in the United States* (2018), available at <https://nca2018.globalchange.gov/>.

historic rates, annual losses in some economic sectors are projected to reach hundreds of billions of dollars by the end of the century—more than the current gross domestic product (GDP) of many U.S. states.²⁸¹

114. The most recent report of the Pennsylvania Independent Fiscal Office has concluded that there is a “structural imbalance” in the Pennsylvania budget.²⁸² That report predicts a budget deficit of \$1.709 billion for fiscal year 2018-2019, with the deficit ranging from a low of 1.446 billion to 1.750 billion over the next four fiscal years.²⁸³

115. The previous report of the Pennsylvania Independent Fiscal Office also cited Pennsylvania’s structural deficit and found that there would be a similar deficit for fiscal year 2017-2018, the projected imbalance was addressed by “a mix of (1) revenue enhancements, transfers and accelerations, (2) expenditure reductions, shift, and deferral, and (3) increased reliance on special funds and federal funds.”²⁸⁴ This mix included sales of Article I, § 27 trust capital, transfers from special funds, and reductions in environmental and natural resource budgets that the Pennsylvania Supreme Court found to be unconstitutional in *Pa. Env’tl. Def. Found. v. Commonwealth*, 161 A.3d 911, 930-31 (Pa. 2017). The Commonwealth has not made any provision to restore the capital that it borrowed from the trust created by Article I, §27.

²⁸¹ *Id.* Summary Finding No. 2.

²⁸² Independent Fiscal Office, Economic & Budget Outlook: Fiscal Years 2018 -19 to 2023 -24 (November 2018) at 1, available at [file:///C:/Users/rober/Downloads/Five Year Outlook 2018%20\(1\).pdf](file:///C:/Users/rober/Downloads/Five Year Outlook 2018%20(1).pdf).

²⁸³ *Id.*

²⁸⁴ *Id.* at 57.

III. Legal Basis for the Proposed Regulation.

The legal mandate imposed upon the Commonwealth by Article I, § 27 of the Pennsylvania Constitution to take meaningful action to limit GHG emissions and the legal authorization to adopt the proposed regulation under the Pennsylvania Air Pollution Control Act, 35 P.S. § 4001 *et seq.* is described in Robert B. McKinstry, Jr. & John C. Dernbach, *Applying the Pennsylvania Environmental Rights Amendment Meaningfully to Climate Disruption*, 10 Mich. J. Env't'l & Admin. L 102 (201_), attached hereto and incorporated herein as Exhibit C. Without limiting the foregoing, Petitioners allege:

1. Article I, § 27 of the Pennsylvania Constitution provides:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.

Its first clause creates individual rights to environmental attributes; the second creates additional rights by making Pennsylvania's public natural resources the property of all the people, including future generations; and the third makes the Commonwealth, and its constituent units, trustees for the environment.

2. The rights provided by the first and second clauses of the ERA represent fundamental, individual rights akin to free speech, freedom of religion and other rights enumerated in Article I of the Pennsylvania Constitution, and they should be interpreted as such. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 953-54, 976 (Pa. 2013) (plurality) ("*Robinson Township*"); *Pa. Env'tl. Def. Found. v. Commonwealth*, 161 A.3d 911, 930-31 (Pa. 2017) ("*PEDF*").
3. The first clause "affirms a limitation on the state's power to act contrary" to the people's right to "clean air, pure water, and the preservation of the natural, scenic, historic, and esthetic values of the environment." As a result, "laws of the Commonwealth that unreasonably impair the right are unconstitutional." *Robinson Township, supra*, 83 A.3d at 951; *PEDF*, 161 A.3d at 930-36.
4. "The drafters seemingly signaled an intent that the concept of public natural resources would be flexible to capture the full array of resources implicating the public interest, as these may be defined by statute or at common law." *Robinson Township, supra*, 83 A.3d at 955; *PEDF*, 161 A.3d at 931.
5. The public natural resources that are made the property of all the people by the second clause and the subject of the Commonwealth's duty as a trustee include "not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property." *Robinson Township, supra*, 83 A.3d at 955; *PEDF*, 161 A.3d at 931. The constitutional rights

created by the second clause of the ERA include the right to enforce the duty of a trustee created by the third clause. *Robinson Township, supra*, 83 A.3d at 955-956; *PEDF*, 161 A.3d at 930-36.

6. The public trust provisions of the ERA are self-executing, as they create constitutional duties that bind all three branches of state government, and they can be applied and enforced by the judicial branch without further legislative action. *Robinson Township, supra*, 83 A.3d at 966067; *PEDF*, 161 A.3d at 936-37.
7. The Commonwealth's duties as a trustee should be governed by the established law applicable to trusts and trustees, including the legal principles articulated in the Restatement of Trusts. *Robinson Township, supra*, 83 A.3d at 955-57; *PEDF*, 161 A.3d at 916-21,28. These trustee duties include prudence ("exercise[ing] ordinary skill, prudence and caution in managing corpus of trust"), loyalty (administering the trust "solely in beneficiary's" interest), and impartiality ("treat[ing] all [beneficiaries] equitably in light of the purposes of the trust"). *Robinson Township, supra*, 83 A.3d at 957, 959; *PEDF*, 161 A.3d at 930-37.
8. Although the climate is not expressly protected under the ERA, the ERA's language and legislative history, as well as the reasoning of both *Robinson Township* and *PEDF*, compel the conclusion that a climate free of human disruption is protected by Article I, § 27.
9. The right to a natural climate unaffected by climate disruption is included within the ERA's first clause, which protects the people of Pennsylvania's right to "clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment" because greenhouse gas pollution and the climate disruption that it will cause will both adversely affect air and water quality.
10. Levels of carbon dioxide in the atmosphere causing climate disruption also violates the people's right to clean air, because pollution is a relative concept. Levels of naturally occurring substances that disrupt the natural functioning of natural ecosystems constitutes pollution. The ERA's right to "clean air," as applied to carbon dioxide, means levels necessary to support plant life and ecosystems, among other things, but not so high as to disrupt ecosystems, as will occur in climate disruption. Similarly, "pure water" means water with levels of carbon dioxide that support the normal functioning of aquatic ecosystems, and that conserves and maintains public natural resources, but not so high as to acidify the water and disrupt those natural systems
11. A stable climate not disrupted by excessive concentrations of GHGs also provides critical natural and historic values of the environment.
12. The right to a natural climate unaffected by human-caused climate disruption is included within the ERA second clause's protection of the public's right to the conservation and maintenance of public natural resources. The Robinson Township plurality emphasized

that the concept of public natural resources encompassed a wide range of values of the natural environment:

At present, the concept of public natural resources includes not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property.

Robinson Twp. v. Commonwealth, 83 A.3d 901, 955 (Pa. 2013) (plurality); *accord Pa. Env'tl. Def. Found. v. Commonwealth*, 161 A.3d 911, 931 (Pa. 2017).

13. Catastrophic climate disruption would radically impair and possibly eliminate the “wild flora, and fauna (including fish),” public forests and their ecosystems, and game and wildlife that the plurality in *Robinson Township* expressly recognized as falling within the public trust obligations of the second and third clauses of Article I, § 27. *Robinson Twp.*, 83 A.3d at 955.
14. A stable climate, not disrupted by the types of changes caused by human emissions of GHGs in the atmosphere, should be understood as a public natural resource to which the people have a right and which the Commonwealth has a trustee’s duty to conserve and maintain. The climate is not a private resource. Rather, the climate represents the seasonal average ranges of temperature, precipitation and other atmospheric conditions in a particular area over a long period of time. Climate determines the nature of wild and other naturally occurring vegetation, fish and other wildlife; the amount and quality of ground and surface water; the characteristics of soils; the flow and extent of streams, rivers and wetlands; air quality; and most other characteristics of naturally occurring ecosystems and natural communities.
15. The public trust rights under Article I, § 27 inhere in “all the people including generations yet to come.” Thus, the virtual certainty that effects of climate disruption will be inequitably distributed and will have greater impacts on generations yet to come implicates Article I, § 27 even if only some people are adversely affected.
16. The Commonwealth has the following overall duties under Article I, § 27 concerning climate disruption. (1) Under the first clause, the Commonwealth may not act contrary to the people’s right to a natural climate unaffected by climate disruption; “laws of the Commonwealth that unreasonably impair the right are unconstitutional.” *Robinson Township*, 83 A.3d at 951; *PEDF*, 161 A.3d at 931. Under the second and third clauses of the public trust provisions of Article I, § 27, the Commonwealth has two duties. One is to “prevent and remedy the degradation, diminution, and depletion” of a natural climate unaffected by human-caused climate disruption, whether harm to the climate results “from direct state action or from the actions of private parties.” *Robinson Township*, 83 A.3d at 957-58; *PEDF*, 161 A.3d at 932-33. The other is “to act affirmatively via legislative action” to conserve the natural climate and prevent undue disruption. *Robinson Township*, 83 A.3d at 957-58; *PEDF*, 161 A.3d at 933. A third duty, which stems from the duty of private trust law duty of prudence, is that the Commonwealth

must analyze the effect of its decisions on the public's right to be protected against climate change prior to making them. *Robinson Township*, 83 A.3d at 952.

17. A judicially ascertainable standard for determining the emissions reductions required to conserve and maintain the climate is provided by an international treaty ratified by the United States, the United Nations Framework Convention on Climate Change (UNFCCC), 1771 U.N.T.S. 107, http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf, the Paris Agreement, Dec. 12, 2015, http://unfccc.int/paris_agreement/items/9485.php, adopted pursuant to that Convention, and the body of internationally-accepted scientific evidence endorsed by the nations of the world pursuant to the UNFCCC and the Paris Agreement. Pennsylvania's share of the reductions is governed by the federal Clean Air Act.
18. The objective of the UNFCCC is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." UNFCCC, art. 2. Reflecting the evolving scientific consensus on the temperature rise at which serious climate disruption will occur, the Paris Agreement interprets the objective to the UNFCCC to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and to "to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change." *Paris Agreement*, art. 2, § 1.
19. Also reflecting the scientific consensus of the nations of the world, the Paris Agreement further defines the emissions reductions required to keep temperatures below those thresholds by requiring that the Parties "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century." *Paris Agreement*, art. 4 § 1.
20. If the entire world needs to reach a point where emissions of GHGs are no greater than their removal by GHG sinks by the second half of this century, Pennsylvania will also need to achieve that balance by that time. Therefore, at a minimum, Pennsylvania must develop an emissions reduction trajectory that reduces net emissions to zero, meaning the elimination of all GHG emissions other than those geologically or biologically returned to sinks (*i.e.* sequestered) by the second half of the 21st century.
21. This is consistent with the UNFCCC requirement that the developed nations take the lead in reducing emissions, enacting policies to limit emissions, and enhance carbon sinks. UNFCCC, art. 3, § 1; art. 3 § 3; art. 4, § 2(a); *Paris Agreement*, art. 4, § 4. These policies are to be precautionary, comprehensive and "cost-effective so as to ensure global benefits at the lowest possible cost . . . and comprise all economic sectors." UNFCCC, art. 3 §§ 2, 3; art. 4, § 2.
22. The proposed regulation will implement the goals of the UNFCCC and the Paris Agreement consistent with the above referenced principles.

23. The provisions of the federal Clean Air Act governing the obligations of states support the proposition that Pennsylvania should consider these treaty obligations in construing its obligations as a trustee under Article I, § 27. Section 115 of the Clean Air Act is triggered whenever the EPA finds air pollution originating within a state “cause[s] or contribute[s] to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country.” 42 U.S.C. § 7415 (a). When that happens, the EPA must require the state to submit an amendment to the “good neighbor” provision of its state implementation plan, *id.*, § 7410(a)(2)(H)(ii), that will “prevent or eliminate the endangerment.” *Id.* §7415(b). These requirements exist because EPA has found that emissions of GHGs within the United States endanger health and the environment in other nations and virtually all other nations of the world are parties to the UNFCCC and the Paris Agreement, which provides the United States reciprocal rights with respect to the prevention and control of greenhouse gases.²⁸⁵
24. The Clean Air Act requires that state implementation plans “include enforceable emissions limitations and other control measures, means, or techniques (including economic incentives such as fees, marketable permits, and auctions of emissions rights)” to meet its requirements. 42 U.S.C. § 7410(a)(2)(A). The proposed regulation provides such measures.
25. A regulatory program that is designed to take all measures reasonably necessary to conserve the corpus of the environmental trust resource for the benefit of the trust’s beneficiaries will most closely hew to the intent and text of the ERA as interpreted in *PEDF* and the *Robinson Township* plurality. That program should therefore employ all measures reasonably necessary to conserve a stable climate and the public environmental resources it supports. This can be best accomplished by putting a price on emissions of GHGs and by recovering the value of that emissions price as income for the beneficiaries of the trust. The proposed regulation will satisfy these Constitutional requirements.
26. The Board is required to adopt the proposed regulation in substantially the form that has been proposed pursuant to its duty as a trustee under Article I, §27 of the Pennsylvania Constitution under the Supreme Court’s reasoning in *PEDF* and the *Robinson Township*

^{285.} *Her Majesty the Queen in Right of Ontario v. Env'tl. Prot. Agency*, 912 F.2d 1525, 1528 (D.C. Cir. 1990); “Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule,” 74 Fed. Reg. 66,496, 66,514 (Dec. 15, 2009); *Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act*, 74 Fed. Reg. 18886, 18903 (April 24, 2009); see *Status of Ratification of the Convention*, UNITED NATIONS, <https://unfccc.int/process/the-convention/what-is-the-convention/status-of-ratification-of-the-convention> (196 nations and 1 regional economic integration organization are Parties) (last visited April 17, 2018); *UNFCCC Status as of 17-04-2018*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=IND&mtdsg_no=XXVII-7&chapter=27&Temp=mtdsg3&clang=en (last visited July 9, 2018); *Paris Agreement – Status of Ratification*, UNITED NATIONS, <https://unfccc.int/process/the-paris-agreement/status-of-ratification> (175 Parties have ratified of 197 Parties to the Convention) (last visited Apr. 17, 2018); *Paris Agreement Status as at 17-04-2018*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=en (last visited July 4, 2018). See *The Paris Agreement* art. 2 §1 (a), art. 3, art. 4 §1; see generally Michael Burger et. al., *Legal Pathways to Reducing Greenhouse Gas Emissions Under Section 115 of the Clean Air Act*, UCLA School of Law, Public Law Research Paper No. 16-11 (Jan. 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2742366.

plurality. First, allowing emissions to continue unabated will increase the damage to the corpus of the trust. If a price is put on the emissions consistent with the social cost of carbon, or emitters are otherwise required to implement all emissions reductions up to that cost, the damage to the corpus of the trust will be avoided consistent with the duty to “conserve and maintain” the trust corpus. Second, the social cost of carbon provides a way of measuring the cost of damage from climate change, including damage to public natural resources, through state actions allowing unregulated emissions of GHGs. Third, the Commonwealth’s duty to “act affirmatively via legislative action to protect the environment,” suggests that the state could use a mechanism like that employed in the proposed regulation to constrain the emissions of GHGs that harm public natural resources. This result seems compelled by the text of the ERA and the trustee’s duty of prudence as found by the Court in *PEDF*. See *PEDF*, 161 A.3d at 932; see also *id.* at 938 (invalidating transfer of funds because it violated the duty of prudence and the duty to use trust assets in accordance with the trust purposes).

27. The proposed regulations will satisfy the requirements Article I, § 27 and satisfy the following prerequisites:

- The proposed regulation will result in the reduction of emissions sufficient to achieve net carbon neutrality by the second half of the century, if not earlier.
- The proposed regulation will either impose a cost on emissions consistent with the social cost of carbon or require all emissions reduction measures less than that cost. In so doing, the proposed regulation starts with a lower cost that grows steadily over time, creating consistency with other programs, generating a predictable framework for investment decisions and facilitating a transition from free emissions to emissions that incur a cost.
- The proposed regulation structure will generate income for the beneficiaries of the trust without impairing the trust’s principal.
- The proposed regulation will cause actual emissions reductions and not result in the transfer of emissions to other unregulated economic sectors, states or nations through the process of leakage.
- The proposed regulation is authorized by existing law and can be implemented administratively without further legislation.

28. The APCA provides DEP with the authority to regulate air pollution in accordance with the federal Clean Air Act. The APCA states that DEP “shall have the power and its duty shall be to [i]mplement the provisions of the Clean Air Act in the Commonwealth.” 35 Pa. Cons. Stat. § 4004(1). The Act further provides that the EQB “[s]hall have the power and its duty shall be to [a]dopt rules and regulations to implement the provisions of the Clean Air Act,” which “shall be consistent with the requirements of the Clean Air Act and the regulations adopted thereunder.” 35 Pa. Cons. Stat. § 4005(a)(8).

29. GHGs are now clearly pollutants regulated under the Clean Air Act. *Coal. for Responsible Regulation, Inc. v. U.S. Env'tl. Prot. Agency*, 684 F.3d 102 (D.C. Cir. 2012) *aff'd in part and rev'd in part on other grounds sub nom*; *Util. Air Regulatory Grp. v. Env'tl. Prot. Agency*, 134 S. Ct. 2427 (2014); *see also* *Funk v. Wolf*, 144 A.3d 228, 250, n.17 (Pa. Commw. Ct. 2016), *aff'd without opinion*, 158 A.3d 642 (Pa. 2017). DEP must regulate those gases, at least to the extent required under the federal Clean Air Act. This includes the requirements under the Clean Air Act's good neighbor provision.
30. The EQB's duty to adopt regulations limiting GHG emissions goes beyond the minimum that may be required under the Clean Air Act, even without considering the Commonwealth's duty as a trustee under the ERA. The APCA provides the EQB with the authority and the mandatory duty to:

Adopt rules and regulations, for the prevention, control, reduction and abatement of air pollution, applicable throughout the Commonwealth or to such parts or regions or subregions thereof specifically designated in such regulation which shall be applicable to all air contamination sources regardless of whether such source is required to be under permit by this act.

35 Pa. Cons. Stat. § 4005(a)(1).

31. The APCA defines "air contaminant" to include a "gas," which therefore includes greenhouse gases. *Id.* at § 4003 (definition of "air contaminant"). The statute defines "air contamination" as the "presence in the outdoor atmosphere of an air contaminant which contributes to any condition of air pollution". *Id.* The EPA endangerment finding under the Clean Air Act, the 2015 DEP report under the Climate Change Act, and a wide variety of other scientific studies support the conclusion that GHGs constitute air pollution as defined in the Pennsylvania Air Pollution Control Act. *See Massachusetts v. Env'tl. Prot. Agency*, 549 U.S. 497, 528-530 (2007) (analysis of why greenhouse gases are air pollutants under the Clean Air Act).
32. DEP has authority under existing law to regulate GHGs through adoption of regulations by EQB, even in the absence of regulations under the federal Clean Air Act. The Pennsylvania Climate Change Act requires not only a report on greenhouse gas impacts every three years but also requires DEP to develop a climate change action plan for submission to the Governor identifying "cost-effective strategies for reducing and offsetting GHG emissions." 71 Pa. Cons. Stat. §§ 1361.3, 1361.7 (2018). This provision would not make sense unless the APCA allowed regulation of GHGs. The fact that the plan is submitted to the administrative branch rather than the legislative branch suggests that the General Assembly contemplated that the administrative branch could implement those strategies through rule-making and other actions already authorized by the General Assembly. Both the APCA and Article I, § 27 authorize the Department to adopt regulations more stringent than federal regulations and require more stringent regulations where necessary to protect health and conserve the Commonwealth's public natural resources. *Commonwealth, Dep't of Env'tl Res. v. Pa. Power Co.*, 384 A.2d 273, 284-85 (Pa. Commw. Ct. 1978); *Eagle Env'tl. II, L.P. v. Commonwealth, Dep't of Env'tl. Prot.*, 144 A.3d 228 (2005).

33. The APCA also provides sufficient authority to support the proposed regulation in that it authorizes the regulation of emissions directly and going “upstream” and regulating fossil fuels where it is impractical to regulate the emissions source. The APCA authorizes and gives the EQB the power and the duty to adopt regulations applicable to “all air contamination sources regardless of whether such source is required to be under permit by this act” and states that these regulations may “prohibit or regulate the combustion of certain fuels.” 35 Pa. Cons. Stat. § 4005(a)(1) (1992).
34. The Pennsylvania Uniform Interstate Air Pollution Agreements Act authorizes participation in interstate trading programs, encouraging DEP to coordinate and cooperate with “State and local authorities of other states affected by air sheds or regional air masses lying partly within another state or states, or moving between or among this State and another state or states. 35 Pa. Cons. Stat. §§ 4101-4106. This authorizes the provision for interstate trading in the proposed regulation, as necessary to prevent leakage.
35. The auction-cap-and-trade program that will be created by the proposed regulation is consistent with Department policy reflected in the *Solar Future Plan*.²⁸⁶ That Plan established a goal of increasing in-state solar generation so to provide 10 percent of in-state electricity consumption by 2030²⁸⁷ and recommended a suite of strategies necessary to accomplish this goal, one of which is to adopt “a carbon pricing program and invest the proceeds in renewable energy and energy efficiency measures.”²⁸⁸ The proposed regulation would establish carbon pricing consistent with this *Plan*.
36. Under the *PEDF* decision, an auction with a reserve price, as provided in the proposed regulation, is constitutionally required to allow the beneficiaries of the trust to benefit from the program. Allowances may be considered to represent ecosystem services in that they represent the limited remaining ability of the atmosphere to absorb additional GHG pollution without disruption. Because the revenues would derive from efforts to preserve the environmental trust, these revenues could be considered the result of the sale of renewable ecosystem services, similar to revenue from timber sales from sustainable management of state forest land.
37. Article VIII, § 13 of the Pennsylvania Constitution requires a balanced budget for operating expenses. By relying on sales of environment trust capital and transfers of dedicated funds that the Supreme Court found unconstitutional in *PEDF* to offset operating expenses in the 2017-2018 fiscal year and prior fiscal years, the Commonwealth violated both that provision and the ERA. Without the sustainable

²⁸⁶ David Althoff Jr., Robert Altenburg et al., *Pennsylvania’s Solar Future Plan: Strategies to increase electricity generation from in-state solar energy* (November 2018) (“*Solar Future Plan*”), available at <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=59861&DocName=PENNSYLVANIA%26%2339%3bS%20SOLAR%20FUTURE%20PLAN.PDF%20%20%3Cspan%20style%3D%22color%3b%22%3E%28NEW%29%3C/span%3E>.

²⁸⁷ *Id.* at x.

²⁸⁸ *Id.* at 76-78.

revenues from sales of renewable environmental attributes under the proposed regulation, the Commonwealth will be unable to address the structural budget deficit or to restore the corpus of the trust created by Article I, § 27 of the Constitution.

III. The Impacts and Parties Affected by the Proposed Regulation.

The proposed regulation will have an impact on all sectors of Pennsylvania's economy, although the impact will vary among businesses and individuals, with some benefitting and some suffering adverse impacts. The proposed regulation is likely to have a significant positive impact on the environment as well as the overall economic and fiscal well-being of the Commonwealth. By reducing GHG emissions from a jurisdiction producing almost one percent of global emissions on the schedule necessary to limit increases in temperature to between 1.5 and 2 degrees C, there is no doubt that the proposed regulation will have a significant positive effect on the natural environment and other trust resources under Article I, § 27 of the Pennsylvania Constitution. It is also likely to have a net positive effect on the Commonwealth's economy and its fiscal health.

Experience with other auction-cap-and-trade programs has confirmed predictions in the economic literature that imposing charges on pollution emissions and returning them to the economy will have an economic stimulatory effect, producing a "double dividend" of environmental improvement and economic growth.²⁸⁹ Thus, both modeling and analysis of the impact of the auction-cap-and-trade program implemented by the states in the Regional Greenhouse Gas Initiative ("RGGI") have shown that that program has increased the gross state product ("GSP") and created net job growth.²⁹⁰ A 2017 study concluded that the benefits arising from air quality improvements associated with emissions reductions caused by the RGGI

²⁸⁹ Lawrence H. Goulder, *Environmental Taxation and the "Double Dividend:" A Reader's Guide* (Nat'l Bureau of Econ. Research, Working Paper No. 4896, 1994); Francesco Bosello et al., *The Double Dividend Issue: Modeling Strategies and Empirical Findings*, 6 *Env't & Dev. Econ.* 9 (2001); Lars G. Hansen, *Is There a Weak Double Dividend? Some Implications of Regulatory Capture and Revenue Rules for Environmental Taxes*, AKF Forlaget (Aug. 1999); Ian W.H. Parry et. al., *When Can Carbon Abate Policies Increase Welfare? The Fundamental Role of Distorted Factor Markets* (Res; for the Future 1998); see, Robert B. McKinstry, Jr., Adam Rose & Coreen Ripp, *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania: Protecting the Environment and Promoting Fiscal Reform*, 14 *Widener L. J.* 205, 220 (2003).

²⁹⁰ Paul J. Hibbard, Susan F. Tierney, Pavel G. Darling & Sarah Cullinan, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI's Third Three-Year Compliance Period (2015-2017)* (April 17, 2018) ("RGGI 2018 Report"), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf; ICF, *RGGI Program Review: REM Modeling Results* (Dec. 2017), https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/REMI_2017_12_19.pdf; Paul J. Hibbard, Susan F. Tierney, Andrea M. Okie, and Pavel G. Darling, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States* (November 2011), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/economic_impact_rggi_report.pdf; Paul J. Hibbard, Andrea M. Okie, Susan F. Tierney, & Pavel G. Darling, *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States* (July 2015) http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf. At least one study suggests that the direct investment of revenues in energy efficiency produces the highest economic growth. Environment Northeast, *Economy-Wide Benefits of RGGI: Economic Growth through Energy Efficiency*, (March 2011). However, any use of revenues that will reduce taxes on productive activity or increase investment will generate economic and job growth.

program during its first six years of operations equaled \$5.7 billion.²⁹¹ The Analysis Group has conducted studies and prepared reports on the economic impacts of the RGGI Program after each three year compliance period. The most recent report reached conclusions similar to those in the earlier report, concluding:

Over the last three years (2015-2017), the RGGI program led to \$1.4 billion (net present value (“NPV”)) of net positive economic activity in the nine-state region. Each RGGI state’s electricity consumers and local economy also experienced net benefits from the RGGI program. When spread across the region’s population, these economic impacts amount to nearly \$34 in net positive value added per capita.²⁹²

Although a similar level of analysis has not been applied to the California economy-wide auction-cap-and-trade program,²⁹³ the initial results suggest that

the state’s climate policy is succeeding — the most recent data show California is just 3 percent above its 2020 goal of reducing emissions to 1990 levels as required by AB 32. Meeting California’s 2020 greenhouse gas emissions goal is turning out to be easier and cheaper than expected.

As California has driven emissions down, its economy has taken off: State job growth has outpaced the rest of the nation by 50 percent (PDF), showing what decoupled carbon emissions and economic growth look like.²⁹⁴

The proposed regulation will generate revenue from the sale of natural resource attributes that will solve Pennsylvania’s chronic budget deficits for decades to come and eliminate the continuing practices that the Pennsylvania Supreme Court found unconstitutional in *PEDF v. Commonwealth*, 161 A.3d 911 (Pa. 2017). The most recent report of the Pennsylvania Independent Fiscal Office has concluded that there is a “structural imbalance” in the

²⁹¹ Abt Associates, *Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014*, (January 2017), <http://abtassociates.com/AbtAssociates/files/7e/7e38e795-aba2-4756-ab72-ba7ae7f53f16.pdf>; cited in, Jonathan L. Ramseur, *The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress* (Congressional Research Service May 16,2017) <https://fas.org/sgp/crs/misc/R41836.pdf>

²⁹² Hibbard et al., *RGGI 1018 Report* at 4. The authors, again, attribute this to reinvestment.

²⁹³ The California Air Resources Board did conduct economic modeling and determined that the current auction cap-and-trade with supplemental mechanisms was the most cost-effective means to achieve the additional reductions necessary to achieve the 2030 goal of reducing 1990 emissions by 40%, with modeling indicating that these additional measures would reduce projected growth in state GDP by a modest 0.4 to 0.6 percent. This did not model the impacts of the overall program, which has already achieved the 2020 goal of reducing 1990 emissions by 20%. The analysis also did not include a cost benefit analysis calculating the very significant health improvements arising from the air quality improvements. Because most health costs are imposed on businesses, reduced health costs should improve economic health as well as the health of the Commonwealth’s residents.

²⁹⁴ Chris Busch, *California cap-and-trade: A success in disguise* (Aug. 10, 2016), <https://www.greenbiz.com/article/california-cap-and-trade-success-disguise>; See also Ashley Lawson, Addressing California cap and trade concerns (April 12, 2017), <https://www.c2es.org/2017/04/addressing-california-cap-and-trade-concerns/>

Pennsylvania budget.²⁹⁵ That report predicts a budget deficit of \$1.709 billion for fiscal year 2018-2019, with the deficit ranging from a low of 1.446 billion to 1.750 billion over the next four fiscal years.²⁹⁶ The revenue that this program will generate will alleviate and likely eliminate that structural deficit, removing the need to increase taxes on productive activities. Application of the 2020 reserve price (\$ 147.211)²⁹⁷ and budget (91% of 2016 emissions) using the 2016 carbon dioxide emissions from the U.S. Energy Information System²⁹⁸ would produce a maximum and inflated revenue figure of \$1.978 billion. This figure is inflated because it includes emissions from industrial sources likely to qualify for direct allocations, which emitted 45.6 million metric tons in 2016, according to EIA. If these are excluded, revenues would equal \$1.563 billion, assuming all allowances are sold and sold at the reserve price. A portion of those revenues would likely go to Philadelphia and Allegheny Counties, who are likely to expand their current air programs to include GHGs, thereby capturing auction revenues attributable to sources in those counties. Nevertheless, the revenues will likely greatly alleviate the budget deficit and, given the fact that the reserve price will increase by 10% plus inflation annually, it has the potential to eliminate the deficit in future fiscal years.

The precise macroeconomic impacts and the impacts by sector will depend upon how the General Assembly, Philadelphia and Allegheny County allocate revenues and direct allocations. Any action that eliminates the need to raise additional taxes on productive activity to balance the budget will have a stimulatory effect on the Commonwealth's economy. Measures taken by the RGGI states and California such as use of revenues to offset low income consumer effects and investment in energy efficiency and alternative energy have the potential to magnify the positive economic effects. Impacts will also differ among and within economic sectors.

In the electricity generation sector, where there will be no direct allocations, companies with low emission fleets will benefit and those with higher emission fleets will face increased costs or decreased profits. The imposition of a cost on carbon will particularly benefit renewable and nuclear generation facilities. It is likely to prevent the premature closure of all well-run existing nuclear facilities other than the most financially stressed and prevent job losses at those facilities. It will likely generate new investment in renewable generation and energy efficiency, and possibly generate new investment in increased nuclear generation capacity through uprates of existing units. A recent report by the Department set forth the Commonwealth's Solar Future Plan and established a goal of increasing in-state solar generation so to provide 10 percent of in-

²⁹⁵ Independent Fiscal Office, Economic & Budget Outlook: Fiscal Years 2018 -19 to 2023 -24 (November 2018) at 1, available at [file:///C:/Users/rober/Downloads/Five Year Outlook 2018%20\(1\).pdf](file:///C:/Users/rober/Downloads/Five Year Outlook 2018%20(1).pdf).

²⁹⁶ *Id.*

²⁹⁷ The Pennsylvania reserve price is based on the higher of a \$10 (in 2020 and increased by the rate of inflation plus 10%) and the highest reserve price in any program to which the Pennsylvania program is linked, which is currently likely to be California.

²⁹⁸ EIA reported carbon dioxide emissions for 2016 217.4 million metric tons, <https://www.eia.gov/environment/emissions/state/excel/pennsylvania.xlsx>, so that the budget for 2020 (0.91) would be 197.8 million metric tons. EIA reported Pennsylvania's 2015 carbon dioxide emissions to be 233 million metric tons, making it the third largest emitter after Texas (626) and California (364). <https://www.eia.gov/state/rankings/?sid=PA#series/226> . This would include all sources but would exclude other GHGs.

state electricity consumption by 2030.²⁹⁹ That *Solar Future Plan* report concluded that a suite of strategies would be necessary to accomplish this goal, one of which is to adopt “a carbon pricing program and invest the proceeds in renewable energy and energy efficiency measures.”³⁰⁰ The proposed regulation would establish carbon pricing and some mechanisms, such as the Philadelphia Energy Authority,³⁰¹ are already in place to reinvest proceeds. The *Solar Future Plan* report further found that this investment in solar generation would produce benefits in public health, economic growth, job opportunities and cleaner air.³⁰² These conclusions apply equally to other types of renewable generation, improvement in nuclear facilities and energy efficiency, where the proposed regulation will equally encourage investment and the same benefits.

The program that will be established by the proposed regulation will also benefit efficient combined cycle natural gas plants, while, in general, having an adverse impact on coal-fired facilities and older, inefficient combustion turbines and reciprocating internal combustion engine generation units. Even the impacts on coal-fired facilities may depend upon implementation. For example, the feasibility of add-on carbon capture and sequestration at a 90% capture rate has been proven at two coal-fired facilities – the Boundary Dam facility in Saskatchewan³⁰³ and the NRG Petra Nova facility in Texas;³⁰⁴ and the owners expect a lower capital cost expenditure for future facilities. With a sufficient price on emissions,³⁰⁵ the use of such technology, particularly if combined with partial use of biomass-based fuels, could sustain the life of existing coal-fired facilities. In addition, the proposed regulation will provide offset credits for remediation of coal waste piles, which will assist existing waste coal-fired generation units and assist the Commonwealth’s continuing efforts to address abandoned minelands.

The availability of direct allocations for industrial facilities subject to interstate or foreign competition that might result in leakage will minimize or eliminate the potential for adverse impacts on most industrial facilities. With direct allocations, companies that reduce GHG emissions through efficiency, electrification or product or fuel substitution may generate additional revenue through sales of excess allowances. Direct allocations are limited to the

²⁹⁹ David Althoff Jr., Robert Altenburg et al., *Pennsylvania’s Solar Future Plan: Strategies to increase electricity generation from in-state solar energy* (November 2018) (“*Solar Future Plan*”) at x, available at <http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=59861&DocName=PENNSYLVANIA%26%2339%3bS%20SOLAR%20FUTURE%20PLAN.PDF%20%20%3Cspan%20style%3D%22color%3b%22%3E%28NEW%29%3C/span%3E>.

³⁰⁰ *Id.* at 76-78.

³⁰¹ <http://www.philaenergy.org/>.

³⁰² *Id.* at x.

³⁰³ *Brief of Amicus Curiae Saskatchewan Power Corporation, Operator of Boundary Dam Carbon Capture and Storage (CCS) Facility, In Support of Respondents* (Dec. 21, 2016), http://blogs.edf.org/climate411/files/2016/12/2016.12.21-SaskPower-Amicus-Brief-for-EPA.pdf?_ga=2.99642398.1483276282.1538095651-822301884.1538095651.

³⁰⁴ EIA, Petra Nova is one of two carbon capture and sequestration power plants in the world (Oct. 31, 2017), http://blogs.edf.org/climate411/files/2016/12/2016.12.21-SaskPower-Amicus-Brief-for-EPA.pdf?_ga=2.99642398.1483276282.1538095651-822301884.1538095651

³⁰⁵ The cost per ton of removal is not public knowledge and the present Administration has failed to gather that information, despite an obligation to do so under section 111 of the Clean Air Act.

allocation rate that would be awarded to the best performing facility in an industrial category or subcategory, so that those that have acted early to reduce emissions will not be adversely affected by awarding excess allowances to more tardy competitors. If a higher emitting tardy competitor requires additional allowances per unit of production to prevent leakage, those who have acted early to reduce emissions are permitted a direct allocation based on the same emission rate as the tardy company, creating a value proposition for the early reducer. Although direct allocations must be reduced at a rate of five percent of the original allocation per year, this will provide a sufficient and sufficiently early market signal to prevent most adverse results.

The requirement for the surrender of allowances for fossil fuel distributors and electricity generation will increase prices for consumers. However, the increases will likely be far lower than normal price fluctuations. Although some of any potential price increase will be borne by fuel suppliers, in 2020, the maximum likely impact would be 8 cents per gallon of gasoline and 5.3 cents per mcf of natural gas or 0.0053 cents per cubic foot.³⁰⁶ The spot price of one mcf of natural gas has fallen by more than two orders of magnitude times the maximum potential increase in natural gas prices over the last decade.³⁰⁷ The maximum impact on the price of gasoline is about 5% of the variation of average *annual* gasoline prices over the last decade. And a far smaller percentage of the day to day variations.³⁰⁸ The RGGI states and California have reduced these impacts by investing proceeds in consumer relief and funding for consumer energy efficiency investments through programs administered by Efficiency Vermont and the Delaware Sustainable Energy Utility (“SEU”). The Pennsylvania General Assembly could act to provide similar consumer relief and savings. We expect that Philadelphia and Allegheny Counties, which have approved air pollution control programs, will take advantage of the opportunity to operate their own GHG auction-cap-and-trade programs and receive income from allowance sales. These jurisdictions include the largest number of low-income residents in the Commonwealth and we expect that they will provide for consumer relief through energy efficiency and renewable energy investments similar to the RGGI jurisdictions and California. Philadelphia has already established an Energy Authority modeled on the existing SEUs. The alleviation of chronic budget shortages in the Pennsylvania General Fund should also free up funds for investment in education and public infrastructure that should benefit all consumers in the Commonwealth. Finally, as discussed in Exhibit C, environmental justice will be served by the proposed regulation because the adverse impacts of climate change will disproportionately affect low income populations.

Based on the extensive cost benefit analyses underlying the development of the federal social cost of carbon and more recent analyses, the benefits of the proposed regulation will clearly outweigh its costs. The federal interagency task force charged with developing a social cost of carbon for use by federal agencies in cost-benefit analysis calculated a variety of values representing the average and high cost of the damages caused by GHG emissions for different

³⁰⁶ This assumes a \$10 per metric ton carbon charge, that a gallon of E10 produces 17.6 pounds of fossil CO₂, that burning one thousand cubic feet (mcf) of natural gas produces 117.10 pounds of CO₂, and there are 2204.62 pounds per metric ton. A portion of any increase will be borne by suppliers in competitive markets.

³⁰⁷ EIA, <https://www.eia.gov/dnav/ng/hist/rngwhhdD.htm>.

³⁰⁸ Average annual prices varied by \$1.48 between a low of \$2.24 in 2016 and a high of \$3.62 in 2012. <https://www.statista.com/statistics/204740/retail-price-of-gasoline-in-the-united-states-since-1990/>

time periods and discount rates.³⁰⁹ The agencies' 2016 report calculated that the average social cost of carbon in 2020 (using a discount rate of 3%) is \$42/ton, but that the 95th percentile (high) cost would be \$123/ton. In 2050, these figures increase to \$69/ton and \$212/ton.³¹⁰ As action is delayed, the social cost of carbon increases because the damage is greater.³¹¹ A more recent peer-reviewed study determined that the social cost of carbon was \$48, considering damages in the United States alone.³¹² These costs represent the marginal cost of avoiding future damage from the emission of a ton of carbon in any given year and they, therefore, do not include the damage that will already occur as a result of past emissions.³¹³

Because the cost of allowances under the proposed regulation will fall between a reserve price below the social cost of carbon and a cost containment price that approximates the social cost of carbon, the marginal value of the damages avoided by putting a price on greenhouse gas emissions under this proposed regulation will always exceed the marginal cost. Moreover, the value of most allowances will be recovered for other productive use. This will increase the proposed regulation's benefits beyond a more typical command-and-control regulation that would impose costs without recovering benefits. It is for this reason that most analysts have referred to this type of regulation as providing a "double dividend."³¹⁴ Thus, based on this work,

³⁰⁹. *Interagency Working Group on Social Cost of Greenhouse Gases, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866* (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf [hereinafter 2016 SCC] at 4; *Interagency Working Group on Social Cost of Greenhouse Gases, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide* (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf.

³¹⁰. 2016 SCC, *supra* note 215 at 4, Table ES-1. Bob Litterman, one of the world's leading economists on pricing risk suggests that the failure of the calculations of the social cost of carbon to incorporate high damage-low probability events results in a lower cost estimates and emphasizes that delay in mitigation by fifteen years will triple the social cost of carbon. Bob Litterman, Kent Daniel & Gernot Wagner, *Applying Asset Pricing Theory to Calibrate the Price of Climate Risk* 43 (March 15, 2017), https://globalriskinstitute.org/wp-content/uploads/2017/05/GRI_Asset-Pricing-Climate-Risk_Mar-15-2017-Litterman.pdf.

³¹¹. See *Env'tl. Prot. Agency, Fact Sheet, Social Cost of Carbon 2* (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf [hereinafter EPA SCC FACT SHEET].

³¹² Katharine Ricke, Larent Drouet, Ken Caldeira & Massimo Tavoni, *Country-level social cost of carbon*, 8 *Nature Climate Change* 895 (2018). As discussed in Exhibit C, the UNFCCC requires that cost-benefit analysis address global damages and that treaty provision is binding on Pennsylvania under the Supremacy Clause of the United States Constitution.

³¹³. See *Env'tl. Prot. Agency, Fact Sheet, Social Cost of Carbon 2* (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf, at 1 ("The SC-CO₂ is a measure, in dollars, of the long-term damage done by a ton of carbon dioxide (CO₂) emissions in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (*i.e.*, the benefit of a CO₂ reduction).")

³¹⁴. See, Lawrence H. Goulder, *Environmental Taxation and the "Double Dividend:" A Reader's Guide* 26 (Nat'l Bureau of Econ. Research, Working Paper No. 4896, 1994); Robert B. McKinstry, Jr.,

the Board and the Department can readily conclude that the benefits of the proposed regulation will far outweigh its costs.

Adam Rose, & Coreen Ripp, *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania: Protecting the Environment and Promoting Fiscal Reform*, 14 Widener L.J. 205, 220-21 (2004) See, also, Marc Gunther, *Climate Converts: The Conservatives Who Are Switching Sides on Warming*, YALEENVIRONMENT360 (Mar. 30, 2017), <http://e360.yale.edu/features/climate-converts-the-conservatives-who-are-switching-sides-on-climate-change>; Jerry Taylor, *The Conservative Case for a Carbon Tax*, NISKANEN CTR. (Mar. 23, 2015), <https://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf>; Bob Litterman, *What is the Right Price for Carbon Emissions*, 36 REGULATION 38 (2013), <https://object.cato.org/sites/cato.org/files/serials/files/regulation/2013/6/regulation-v36n2-1-1.pdf>.

Exhibit A
Identification of Petitioners

The parties identified below subscribe to and have duly authorized the submission to the Pennsylvania Environmental Quality Board of the attached *Petition Pursuant to 25 Pa. Code §§23.1-23.5, Article I, §27 of the Pennsylvania Constitution, and the Pennsylvania Air Pollution Control Act to Adopt the Attached Regulation Establishing a Comprehensive Program to Limit Greenhouse Gas Emissions to Conserve and Maintain a Stable Climate and Other Public Resources for Which The Commonwealth is a Trustee* and to be identified as Petitioners on said Petition.

1. Clean Air Council
Petitioner Joseph Minott as Executive Director and Chief Counsel and in his individual capacity
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215-567-4004
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rrouth@cleanair.org

Petitioner Clean Air Council is a member-supported environmental organization headquartered in Philadelphia, Pennsylvania. The Council is dedicated to protecting and defending everyone's right to breathe clean air. The Council works through a broad array of related sustainability and public health initiatives, using public education, community action, government oversight, and enforcement of environmental laws. The Council is currently fighting for strong regulations of carbon dioxide ("CO₂") and methane at both the state and national level. These pollutants make up over 90% of America's greenhouse gas emissions. Due to its emissions of CO₂ and methane, Pennsylvania alone is responsible for a full 1% of the world's greenhouse gasses.

2. Robert B. McKinstry, Jr.
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bobby@robertbmckinstryjr.com
610-444-4449
3. Widener University Commonwealth Law School Environmental Law and Sustainability Center
John Dernbach, Commonwealth Professor of Environmental Law and Sustainability, in his capacity as Director and in his individual capacity
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Widener University Commonwealth Law School's Environmental Law and Sustainability Center explores the ways that the law can be used to address such issues as environmental rights and protection of the land, air, and water for future generations. Faculty associated with

the Center have a national and international reputation for teaching and scholarship on the critical environmental policy questions of the 21st century, including climate change. At all levels of governance, Center faculty have proposed and advocated reforms to environmental laws and evaluated the effectiveness of these laws.

4. eco(n)law LLC
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baird@eco-n-law.net

5. Lansdowne Friends School
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Judy N. Asselin, in her capacity Clerk of the School Committee and in her individual capacity
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6. Physicians for Social Responsibility- Pennsylvania (“PSR”)
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Walter Tsou, MD, MPH, Interim Executive Director, PSR Philadelphia
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PSR is a national network of 50,000 members and activists who provide a vital health voice to policy makers and the public. PSR has the science and the credible solutions to combat climate change, nuclear weapons and toxics in the environment.

7. Capital Markets Partnership (“CMP”)
Mike Italiano, CEO
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CMP is a nonprofit coalition that defined the business case as released at the NYSE that statistically in 10 years of data, green bonds and their underlying assets are more profitable, less risky, and preferred by investors with over \$70 trillion in assets. With leading investment banks, CMP developed consensus underwriting standards identifying increased green bond cash flow that resulted in higher bond credit ratings, and is structuring green bonds with investment banks, rating agencies, and investors. CMP is working to stimulate the economy and reduce the near term \$6 trillion / 60 gigatons in carbon pollution identified in the *Business Case*, to keep dangerous climate manageable and allow resilience to work, up 10 times since 2009.

8. Donald A. Brown, Scholar in Residence and Professor of Sustainability Ethics and Law
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9. Amy Sinden, James E. Beasley Professor of Law
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10. A Call to the Bar: Lawyers for Common Sense on Climate Change
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215-438-6600

A Call to the Bar is a national, nonpartisan, nonprofit group of lawyers, law professors, law students, and citizens that seeks to advance the law with common sense solutions to climate change.

11. Central Philadelphia Monthly Meeting of the Society of Friends
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12. Germantown Monthly Meeting of the Society of Friends
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13. Westtown Monthly Meeting of the Society of Friends
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14. Pennsylvania Environmental Defense Foundation
Ron Evans, President
John E. Childe, as Attorney for PEDF and in his individual capacity
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Through legal action, PEDF helps the citizens of PA assert their right to a clean healthy environment.

15. Friends Fiduciary Corporation
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We are a Quaker non-profit organization providing cost effective, professional socially responsible investment management services exclusively to Friends meetings, churches, schools and organizations.

16. Philadelphia Solar Energy Association
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17. Anton Andrew
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18. RER Energy Group and Sunvestment Energy Group
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19. Eco-Justice Collaborative of Philadelphia Yearly Meeting
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20. Frankford Friends Meeting
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21. Chestnut Hill Friends Meeting
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22. Graboyes Efficiency Tenant, LLC
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23. Chestnut Hill United Church
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24. Citizens for Pennsylvania's Future (PennFuture)
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PennFuture is the independent, nonpartisan voice leading the transition to a clean energy economy in Pennsylvania and beyond. We are protecting our air, water and land, and empowering citizens to build sustainable communities for future generations.

25. East Marlborough Township
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Laurie Prysock, Township Manager
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26. Geoenergy LLC
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27. Northeast Pa. Audubon Society
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We are a chapter of National Audubon Society whose mission is "to conserve and restore our environment to benefit humanity as well as birds and wildlife through education, action, and advocacy." We have approximately 500 members in Wayne, Pike, Lackawanna, and Pike Counties in Pennsylvania.

28. Philadelphia Quarterly Meeting (of the Religious Society of Friends)
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29. Lansdowne Friends Meeting
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30. Nottingham Monthly Meeting (also known as Oxford Friends Meeting) of the Religious Society of Friends
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31. Swarthmore Friends Meeting
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32. evolveEA
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46. Old Haverford Monthly Meeting of the Religious Society of Friends
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47. Temple Environmental Law Society
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48. Lily McIntyre
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Lily was one of the petitioners in *Funk v. Wolf*, 144 A.3d 228 (Pa. Cmwlth. 2016), which sought mandamus to require the Commonwealth to regulate greenhouse gases. The Commonwealth Court specifically found that Lily had “sufficiently alleged facts conferring her standing to assert the claims in the Petition.” 144 A.3d at 246-47.

49. Darius Abrams
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Darius was one of the petitioners in *Funk v. Wolf*, 144 A.3d 228 (Pa. Cmwlth. 2016), which sought mandamus to require the Commonwealth to regulate greenhouse gases.

50. Westtown School
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PERC is an alliance of Pennsylvania colleges and universities working on increasing sustainability—on the campus and in the broader world.

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Liberty Resources, Inc. is a not-for-profit, Consumer-controlled organization that advocates and promotes independent living for all persons with disabilities. As a Center for Independent Living (CIL), Liberty Resources advocates with people with disabilities, individually and collectively to ensure our civil rights and equal access to all aspects of life in the community.

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Founded in 1917, the American Friends Service Committee (AFSC) is a Quaker organization devoted to service, development, and peace programs throughout the world. Our work is based on the belief in the worth of every person, and faith in the power of love to overcome violence and injustice. Drawing on continuing spiritual insights and working with people of many backgrounds, we nurture the seeds of change and respect for human life that transform social relations and systems.

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We are a registered community organization in Philadelphia promoting sustainable growth and community interests in our neighborhood.

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Kitchen Cred encourages healthy life choices and life skills by using cooking as a vehicle. We work with middle and high school age youth because we realize that regardless of socioeconomic situation, this age group is at risk.

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Petitioner, The Shalom Center, provides a prophetic voice in Jewish, Multireligious, & American worlds for peace, justice, and healing of the Earth.

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We are a Friends School for children with complex challenges. Founded in 1982, it is our mission to help children blossom socially, behaviorally, and academically.

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Indivisible Lower Merion, founded by Tina Stein, MD and Ashley Best-Raiten in January 2017, is one of thousands of Indivisible groups throughout the country dedicated to resisting Donald Trump's agenda. The organization has approximately 800 members.

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Indivisible Narberth and Beyond, founded by Nancy Kleinberg, is one of the thousands of Indivisible Groups and has approximately 1200 members.

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Unami Friends Monthly Meeting, a member of Philadelphia Yearly Meeting, was begun intentionally in the early 1970s to align itself more fully with Quaker values of integrity and simplicity, to emphasize human dignity, and to live out a right relationship with the environment.

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Providence Friends Meeting is a Quaker Meeting that consists of a congregation of about 150 families. Visitors and attenders are always welcome. We hold regular weekly religious services throughout the year. The Meeting was founded in 1684 and has been in continuous operation since then in Media, Pennsylvania.

85. Pennsylvania Council of Churches
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The Pennsylvania Council of Churches is a voluntary association of separated and autonomous Christian churches, within a defined geographical area, through which its members seek to manifest their fellowship with one another, to engage in common activities of witness and service, and to advance towards the goal of visible unity.

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The Public Interest Law Center uses high-impact legal strategies to advance the civil, social, and economic rights of communities in the Philadelphia region facing discrimination, inequality, and poverty. We use litigation, community education, advocacy, and organizing to secure their access to fundamental resources and services.

88. Uwchlan Friends Meeting
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We are a congregation of Quakers.

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We are a Community Health Center providing comprehensive primary care, behavioral health and dental to 24,000 people, primarily low income people in five sites in Philadelphia.

90. Sadsbury Friends Meeting
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We are a Quaker Meeting in eastern Lancaster County, Pennsylvania. Friends (Quakers) hold stewardship of the environment to be one of our important testimonies.

91. Ferguson Township
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Ferguson Township is a Home-Rule Municipality in Centre County, Pennsylvania that is home to approximately 19,000 residents. In 2017, the Board of Supervisors adopted a greenhouse gas emissions reduction resolution with the goal of achieving net-zero greenhouse gas emissions no later than 2050 in a manner that is transparent, fair, and economically feasible.

92. Harrisburg Friends Meeting
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Harrisburg Friends Meeting is a Quaker Meeting located in sight of the Capitol Building and near the Susquehanna River. Harrisburg Friends Meeting's awareness of the impact of climate change now and the challenges Harrisburg and the world will face leave us requesting immediate action from our state government to implement policies that will include Pennsylvania's residents, businesses, and industry in the solution to lowering our statewide impact on our global climate.

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We are a **Faith** based, Christian, Religious organization, (Quaker) in Reading Pennsylvania. (108 North 6th Street, Reading, PA 19601). One of our testimonies is Stewardship, including stewardship of a healthy Earth for future generations.

Janet Lamborn is an individual person, American/Pennsylvanian who is concerned about the future of our Earth. There is nothing more important than the stewardship of our environment for future generations, and reducing carbon emission is one method of doing so.

94. Narberth 2050
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We are Narberth residents and neighbors who are working to promote environmental sustainability, a vibrant business district, and affordable housing. Narberth became the first town in the state to enact legislation regulating single-use plastics in a unanimous borough council vote.

95. American Carbon Registry, an enterprise of Winrock International
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The American Carbon Registry (ACR), a nonprofit enterprise of Winrock International, was founded in 1996 as the first private voluntary greenhouse gas registry in the world. In both the voluntary carbon market and California's regulated carbon market, ACR oversees the registration and verification of greenhouse gas mitigation projects following robust carbon accounting methodologies and issues offsets on a transparent registry system. As an approved Offset Project Registry for California's highly successful cap-and-trade program, ACR has issued the majority of the 145 million offsets. The petition's proposed regulation reflects a proven model that will enable Pennsylvania to achieve ambitious climate action compatible with a strong economy.

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Capital Region Indivisible is an all-volunteer citizen-activist group dedicated to civic education and participation, and ensuring that our true American values of justice, fairness, equality, opportunity, and compassion are prioritized in a genuinely representative and forward-thinking government.

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The University of Pennsylvania Environmental Law Project (ELP) fosters campus discussion of environmental issues and connects interested students to opportunities to explore environmental legal practice. Our volunteer work falls into two projects: impact litigation and regulation. Our impact litigation work generally involves preparing legal research and reports for local and national environmental organizations. Our regulatory project develops comments on proposed federal administrative rulemakings in the environmental space that are ultimately published in the Federal Register.

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United Friends is a small, preschool through 8th grade Quaker School in Quakertown, PA. We are committed to teaching and learning the Quaker testimonies and, in particular, stewardship of the Earth.

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Beaver County Marcellus Awareness Community (BCMAC) is a 501(c)(3) organization that seeks to inform the citizens of Western Pennsylvania, specifically those in Beaver County, about Marcellus Shale unconventional gas drilling, and to protect our natural environment by promoting and supporting sustainable energy alternatives to carbon-based energy sources.

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Climate Reality: Pittsburgh & SWPA unites 10 counties in Southwestern Pennsylvania under one chapter to achieve maximum impact in our region. We are dedicated to shaping the conversation on climate and strengthening the movement for solutions-demanding action on the climate crisis in SWPA.

105. Additional petitioners wish to join this petition and will be added by way of supplementation to this Exhibit.

Exhibit B
Proposed Regulation

**CHAPTER 147: PENNSYLVANIA CAP ON GREENHOUSE GAS EMISSIONS AND
MARKET-BASED COMPLIANCE MECHANISMS**
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Subchapter 1: Purpose, Findings and Definitions

§ 147.000. Purpose.

The purpose of this chapter is to reduce emissions of greenhouse gases associated with entities identified in this chapter through the establishment, administration, and enforcement of the Pennsylvania Greenhouse Gas Cap-and-Trade Program by applying an aggregate greenhouse gas allowance budget on covered entities and providing a trading mechanism for compliance instruments.

§ 147.101. Findings

(a) Disruption of the climate caused by the buildup of greenhouse gases in the atmosphere poses an existential threat to the health and welfare of present and future generations of Pennsylvanians and to the conservation of the public natural resources of the Commonwealth with respect to which the Commonwealth has a duty as a trustee under Article I, § 27 of the Pennsylvania Constitution.

(b) The scientists on the Intergovernmental Panel on Climate Change have reached the consensus scientific conclusion that the worst adverse impacts of climate disruption cannot be avoided unless worldwide greenhouse gas emissions are reduced by approximately 45% from 2010 levels by 2030 and to the point that the emissions are no greater than uptake by long term sinks by 2050.

(c) Pennsylvania's emissions of greenhouse gases are globally significant, exceeding the emissions of most nations of the world on both an absolute and per capita basis. The world cannot achieve the emissions reductions necessary to prevent the worst adverse impacts of climate disruption unless Pennsylvania achieves the same or greater emissions reductions as the Intergovernmental Panel on Climate Change has found are necessary for the world as a whole.

(d) Any delay by Pennsylvania in achieving the emissions reductions required under this chapter will cause irreparable harm to the conservation of public natural resources protected by Article I, § 27 of the Constitution and the health and welfare of current and future generations of Pennsylvanians.

(e) After they are released from fossil sinks into the ambient air greenhouse gases persist and their concentrations increase. The most common greenhouse gas, carbon dioxide,

will persist in the environment for millennia after being released from fossil sinks as the result of the combustion of fossil fuels, anthropogenic alteration of carbonate rocks, or releases from other carbon sinks.

(f) If the emissions reductions required under this chapter are delayed, slowed or reduced, the additional greenhouse gases added to the atmosphere will persist, causing irreparable harm and requiring greater and more costly emissions reductions or costly efforts to remove them from the atmosphere in the future.

(g) Based on scientifically defensible determinations of the social cost of carbon with an appropriate risk premium, the benefits of this chapter will far outweigh any costs.

(h) By putting an appropriate price on emissions of greenhouse gases and providing long term certainty to its industries, this chapter will encourage the development of sustainable industries and sustainable development that will strengthen the economy of the Commonwealth.

§ 147.002. Definitions.

(a) Definitions. For the purposes of this chapter, the following definitions shall apply: “Account Viewing Agent” means an individual authorized by a registered entity to view all the information on the entity’s accounts contained in the tracking system.

“Accounts Administrator” means the entity acting in the capacity to administer the accounts identified in this regulation. This may be DEP or an entity with whom DEP enters into a contract.

“Activity-Shifting Leakage” means increased GHG emissions or decreased GHG removals that result from the displacement of activities or resources from inside the offset project’s boundary to locations outside the offset project’s boundary as a result of the offset project activity.

“Additional” means, in the context of offset credits, greenhouse gas emission reductions or removals (i) that exceed any greenhouse gas reduction or removals otherwise required by law, regulation or legally binding mandate, (ii) that result from projects whose creditable processes or activities are not subject to the requirement to retire compliance instruments pursuant to this Chapter 147, and (iii) result from projects that operate in compliance with all applicable laws regulations and legally binding mandates.

“Adverse Offset Verification Statement” means an Offset Verification Statement rendered by a verification body attesting that the verification body cannot say with reasonable assurance that the submitted Offset Project Data Report is free of an offset material misstatement, or that it cannot attest that the Offset Project Data Report conforms to the requirements of this chapter or applicable Compliance Offset Protocol.

“Allowance” means a limited tradable authorization to emit up to one metric ton of carbon dioxide equivalent.

“Alternate Account Representative” means an individual designated pursuant to section 147.132 to take actions on an entity’s accounts.

“Annual Allowance Budget” means the number of Pennsylvania Greenhouse Gas Allowances associated with one year of the Cap-and-Trade Program as specified in subchapter 6.

“Asset Controlling Supplier” means any entity that owns or operates interconnected electricity generating facilities or serves as an exclusive marketer for these facilities even though it does not own them, and is assigned a supplier-specific identification number and system emission factor by DEP for the wholesale electricity procured from its system and imported into Pennsylvania. Asset Controlling Suppliers are considered specified sources.

“Assigned Emissions” or “Assigned Emissions Level” means an amount of emissions, in CO₂e, assigned to the reporting entity by the Department.

“Associated Gas” or “Produced Gas” means a natural gas that is produced in association with the production of crude oil.

“Auction” means the process of selling Pennsylvania Greenhouse Gas Allowances, along with allowances from External Greenhouse Gas Emissions Trading Systems with which Pennsylvania has linked its Cap-and-Trade Program pursuant to subchapter 12, by offering them up for bid, taking bids, and then distributing the allowances to winning bidders.

“Auction Administrator” shall mean the Secretary or other person designated to administer the Auction pursuant to section 147.212(a).

“Auction Purchase Limit” means the limit on the number of allowances one entity or a group of affiliated entities may purchase from the share of allowances sold at a quarterly auction.

“Auction Reserve Price” means a price for allowances below which bids at auction would not be accepted.

“Auction Settlement Price” means the price announced by the Auction Administrator at the conclusion of each quarterly auction. It is the price which all successful bidders will pay for their allowances and also the price to be paid to those entities which consigned allowances to the auction.

“Authorized Holder” is defined in Section 147.120 (d).

“Authorized Project Designee” means an entity authorized by an Offset Project Operator to act on behalf of the Offset Project Operator. The Authorized Project Designee must be a Primary Account Representative or Alternate Account Representative on the Offset Project Operator’s Holding Account.

“Aviation Gasoline” means a mixture of volatile hydrocarbons, with or without additives, suitably blended to be used in aviation reciprocating engines.

“Banking” means the holding of compliance instruments from one compliance period for the purpose of sale or surrender in a future compliance period.

“Barrel of Gas Processed Equivalent,” means the volume of associated gas, waste gas, and natural gas processed converted to barrels at 5.8 MMBtu per barrel.

“Barrel of Oil Equivalent,” with respect to reporting of oil and gas production, means barrels of crude oil produced, plus associated gas and dry gas produced, converted to barrels at 5.8 MMBtu per barrel.

“Biodiesel” means a diesel fuel substitute produced from nonpetroleum renewable resources that meet the registration requirements for fuels and fuel additives established by the U.S. Environmental Protection Agency under section 211 of the Clean Air Act. It includes biodiesel that is all of the following: registered as a motor vehicle fuel or fuel additive under 40 C.F.R. Part 79; a mono-alkyl ester; meets American Society for Testing and Material designation ASTM D 6751-08 (Standard Specification for Biodiesel Fuel Blendstock (B100) for Middle Distillate Fuels, 2008); intended for use in engines that are designated to run on conventional diesel fuel; and derived from nonpetroleum renewable resources.

“Biogas” means gas that is produced from the breakdown of organic material in the absence of oxygen. Biogas is produced in processes including anaerobic digestion, anaerobic decomposition, and thermochemical decomposition. These processes are applied to biodegradable biomass materials, such as manure, sewage, municipal solid waste, green waste, and waste from energy crops, to produce landfill gas, digester gas, and other forms of biogas.

“Biomass” means non-fossilized and biodegradable organic material originating from plants, animals, and microorganisms, including products, by-products, residues, and waste from agriculture, forestry, and related industries as well as the non-fossilized and biodegradable organic fractions of industrial and municipal wastes, including gases and liquids recovered from the decomposition of non-fossilized and biodegradable organic material. For the purpose of this chapter, biomass includes both Pennsylvania Alternative Energy Portfolio Standard (“AEPS”) eligible and non-eligible biomass.

“Biomass-Derived Fuels” or “Biomass Fuels” or “Biofuels” means fuels derived from biomass.

“Biomethane” means biogas that meets pipeline quality natural gas standards.

“Budget Year” means the calendar year to which an annual allowance budget is assigned pursuant to subchapter 6.

“Calendar Year” means the time period from January 1 through December 31.

“Cap” means the total number of Pennsylvania GHG Allowances that the Department may issue for a calendar year.

“Cap-and-Trade Program” means the requirements of this chapter.

“Carbon Dioxide” or “CO₂” means the most common of the primary greenhouse gases, consisting on a molecular level of a single carbon atom and two oxygen atoms.

“Carbon Dioxide Equivalent” or “CO₂ equivalent” or “CO₂e” means the number of metric tons of CO₂ emissions with the same global warming potential as one metric ton of another greenhouse gas. Global warming potential values shall be determined consistent with the definition of Carbon Dioxide Equivalent in the MRR.

“Carbon Dioxide Supplier” or “CO₂ Supplier” means (a) facilities with production process units located in the Commonwealth of Pennsylvania that capture a CO₂ stream for purposes of supplying CO₂ to another entity or facility or that capture the CO₂ stream in order to utilize it for geologic sequestration where capture refers to the initial separation and removal of CO₂ from a manufacturing process or any other process, (b) facilities with CO₂ production wells located in the Commonwealth of Pennsylvania that extract or produce a CO₂ stream for purposes of supplying CO₂ for commercial applications or that extract a CO₂ stream in order to utilize it for geologic sequestration, (c) exporters (out of the Commonwealth of Pennsylvania Pennsylvania) of bulk CO₂ that export CO₂ for the purpose of geologic sequestration, (d) exporters (out of the Commonwealth of Pennsylvania Pennsylvania) of bulk CO₂ that export for purposes other than geologic sequestration, and (e) importers (into the Commonwealth of Pennsylvania Pennsylvania) of bulk CO₂. This source category is focused on upstream supply and is not intended to place duplicative compliance obligations on CO₂ already covered upstream. The source category does not include transportation or distribution of CO₂; purification, compression, or processing of CO₂; or on-site use of CO₂ captured on-site.

“Carbon Stock” means the quantity of carbon contained in an identified GHG reservoir.

“Cogeneration” means an integrated system that produces electric energy and useful thermal energy for industrial, commercial, or heating and cooling purposes, through the sequential or simultaneous use of the original fuel energy. Cogeneration must involve generation of electricity combined with useful thermal energy or with some form of waste heat recovery. Some examples of cogeneration include: (a) a gas turbine or reciprocating engine generating electricity by combusting fuel, which then uses a heat recovery unit to capture useful heat from the exhaust stream of the turbine or engine; (b) Steam turbines generating electricity as a byproduct of steam generation through a fired boiler; (c) Cogeneration systems in which the fuel input is first applied to a thermal process such as a furnace and at least some of the heat rejected from the process is then used for power production. For the purposes of this chapter, a combined-cycle power generation unit, where none of the generated thermal energy is used for industrial, commercial, or heating and cooling purposes (these purposes exclude any thermal energy utilization that is either in support of or a part of the electricity generation system), is not considered a cogeneration unit.

“Combustion Emissions” means greenhouse gas emissions occurring during the exothermic reaction of a fuel with oxygen.

“Compliance Account” means an account created by the accounts administrator for a covered entity or opt-in covered entity with a compliance obligation, to which the entity transfers compliance instruments to meet its annual and full compliance period compliance obligations.

“Compliance Instrument” means an allowance or offset, issued by DEP or by an External Greenhouse Gas Emissions Trading System to which Pennsylvania has linked its Cap-and-Trade Program pursuant to subchapter 12, or sector-based offset credit. Each compliance instrument can be used to fulfill a compliance obligation equivalent to up to one metric ton of CO₂e.

“Compliance Obligation” means the quantity of verified reported emissions or assigned emissions for which an entity must submit compliance instruments to DEP.

“Compliance Offset Protocol” means an offset protocol approved by the Department or approved by reference under this chapter.

“Compliance Period” means the three-year period for which the compliance obligation is calculated for covered entities except for the first compliance period under section 147.140(a).

“Compressed natural gas” or “CNG” means natural gas in high-pressure containers that is highly compressed (though not to the point of liquefaction), typically to pressures ranging from 2900 to 3600 psi.

“Conflict of Interest” means, for purposes of this chapter, a situation in which, because of financial or other activities or relationships with other persons or organizations, a person or body is unable or potentially unable to render an impartial Offset Verification Statement of a potential client’s Offset Project Data Report, or the person or body’s objectivity in performing offset verification services is or might be otherwise compromised.

“Conservative” means, in the context of offsets, utilizing project baseline assumptions, emission factors, and methodologies that are more likely than not to understate net GHG reductions or GHG removal enhancements for an offset project to address uncertainties affecting the calculation or measurement of GHG reductions or GHG removal enhancements.

“Consumer Price Index for All Urban Consumers” means a measure that examines the changes in the price of a basket of goods and services purchased by urban consumers and is published by the U.S. Bureau of Labor Statistics.

“Contract Description Code” means the alphanumeric code assigned by an exchange to a particular exchange product that differentiates the product from others traded on the exchange.

“Counterparty” means the opposite party in a bilateral agreement, contract, or transaction.

“Covered Entity” means an entity within Pennsylvania that has one or more of the processes or operations within Pennsylvania that gives rise to a compliance obligation as specified in subchapter 7 of this regulation; and that has emitted, produced, imported, manufactured, or delivered in 2016 or any subsequent year more than the applicable threshold level specified in section 147.112(a) of this rule.

“Crediting Baseline” means a sectoral baseline approved by the DEP for a sector-based crediting program under subchapter 14 after the imposition of greenhouse gas emission reduction requirements or incentives.

“Crediting Period” means the pre-determined period for which an offset project will remain eligible to be issued DEP offset credits or registry offset credits for verified GHG emission reductions or GHG removal enhancements.

“Data Year” means the calendar year in which emissions occurred.

“Deforestation” means direct human-induced conversion of forested land to non-forested land.

“Delivered Electricity” means electricity that was distributed from a PSE and received by a PSE or electricity that was generated, transmitted, and consumed.

“DEP ID” means, for the purposes of this chapter, the unique identification number assigned to each facility, supplier, and electric power entity that reports GHG emissions to the DEP pursuant to MRR.

“DEP Offset Credit” means a tradable compliance instrument issued by DEP that represents a GHG reduction or GHG removal enhancement of one metric ton of CO₂e. The GHG reduction or GHG removal enhancement must be real, additional, quantifiable, permanent,

verifiable, and enforceable. DEP offset credits may only be issued for GHG emission reductions or GHG removal enhancements that occur during a “Reporting Period,” as defined in this section.

“Diesel Fuel” means Distillate Fuel No. 1 and Distillate Fuel No. 2, including dyed and non-taxed fuels.

“Direct GHG Emission Reduction” means a GHG emission reduction from applicable GHG emission sources, GHG sinks, or GHG reservoirs that are under control of the Offset Project Operator or Authorized Project Designee.

“Direct GHG Removal Enhancement” means a GHG removal enhancement from applicable GHG emission sources, GHG sinks, or GHG reservoirs under control of the Offset Project Operator or Authorized Project Designee.

“Distillate Fuel No. 1” has a maximum distillation temperature of 550 F at the 90 percent recovery point and a minimum flash point of 100 F and includes fuels commonly known as Diesel Fuel No. 1 and Fuel Oil No. 1 but excludes kerosene. This fuel is further subdivided into categories of sulfur content: High Sulfur (greater than 500 ppm), Low Sulfur (less than or equal to 500 ppm and greater than 15 ppm), and Ultra Low Sulfur (less than or equal to 15 ppm).

“Distillate Fuel No. 2” has a minimum and maximum distillation temperature of 540 F and 640 F at the 90 percent recovery point, respectively, and includes fuels commonly known as Diesel Fuel No. 2 and Fuel Oil No. 2. This fuel is further subdivided into categories of sulfur content: High Sulfur (greater than 500 ppm), Low Sulfur (less than or equal to 500 ppm and greater than 15 ppm), and Ultra Low Sulfur (less than or equal to 15 ppm).

“Distillate Fuel No. 4” means a distillate fuel oil with a minimum flash point of 131 °F made by blending distillate fuel oil and residual fuel oil.

“Distillate Fuel Oil” means a classification for one of the petroleum fractions produced in conventional distillation operations and from crackers and hydrotreating process units. The generic term “distillate fuel oil” includes kerosene, kerosene-type jet fuel, diesel fuels (Diesel Fuels No. 1, No. 2, and No. 4), and fuel oils (Fuel Oils No. 1, No. 2, and No. 4).

“Distilled spirit” means a spirit made from the separation of alcohol and a fermented product.

“District Heating Facility” means a facility that, at a central plant, produces hot water, steam, and/or chilled water that is distributed to buildings and facilities connected to the system that are not part of the same facility. District Heating Facility does not include a facility that produces electricity.

“Dry Gas” means a natural gas that is produced from gas wells not associated with the production of crude oil.

“Electric Power Entity” means electricity importers and exporters and retail providers.

“Electrical Distribution Utility(ies)” or “EDU” means an entity that owns and/or operates an electrical distribution system that provides electricity to retail end users in Pennsylvania.

“Electricity Generating Facility” means a facility that generates electricity and includes one or more generating units at the same location.

“Electricity Importers” deliver imported electricity to Pennsylvania from a generation facility in a jurisdiction that is not linked to the Pennsylvania cap-and-trade programs as identified by the PJM GATS system.

“Emissions” means the release of greenhouse gases into the atmosphere from sources and processes in a facility, including from the combustion of transportation fuels such as natural gas, petroleum products, and natural gas liquids. In the context of offsets, “emissions” means the release of greenhouse gases into the atmosphere from sources and processes within an offset project boundary.

“Emissions Data Report” or “greenhouse gas emissions data report” or “report” means the report prepared by an operator or supplier each year and submitted by electronic means to DEP that provides the information required by MRR. The emissions data report is for the submission of required data for the calendar year prior to the year in which the report is due. For example, a 2020 emissions data report would cover emissions and product data for the 2020 calendar year and would be reported in 2021.

“Emissions Efficiency Benchmark” or “GHG emissions efficiency benchmark” means a performance standard used to evaluate GHG emissions efficiency between or among similar facilities or operations in the same industrial sector.

“End User” means a final purchaser of an energy product, such as electricity, thermal energy, or natural gas not for the purposes of retransmission or resale. In the context of natural gas consumption, an “end user” is the point to which natural gas is delivered for consumption.

“Enforceable” means the authority for DEP to hold a particular party liable and to take appropriate action if any of the provisions of this chapter are violated.

“Enhanced Oil Recovery” or “EOR” means the use of certain methods such as steam (thermal EOR), water flooding or gas injection into existing wells to increase the recovery of crude oil from a reservoir. In the context of this rule, EOR also applies to injection of critical phase carbon dioxide into a crude oil reservoir to enhance the recovery of oil.

“Enterer” means an entity that imports, into Pennsylvania, motor vehicle fuel, diesel fuel, fuel ethanol, biodiesel, or non-exempt biomass-derived fuel or renewable fuel and who is the importer of record under federal customs law or the owner of fuel upon import into Pennsylvania, if the fuel is not subject to federal customs law. Only entities that import the fuels specified in this definition outside the bulk transfer/terminal system are subject to reporting under the regulation.

“Entity” means a person, firm, association, organization, partnership, business trust, corporation, limited liability company, company, or government agency.

“Entity type” means the type of entity based on the qualification to register in the tracking system as a covered entity (pursuant to section 147.111), an opt-in covered entity (pursuant to section 147.113), or a voluntarily associated entity (pursuant to section 147.114).

“Exchange” means a marketplace with established rules and regulations where buyers and sellers conduct trades.

“Expected Settlement Date” is a date specified in a transaction agreement on which all requirements in the transaction agreement for all or a specified tranche of deliveries are expected to be settled, exclusive of any contingencies specified in the agreement.

“Expected Termination Date” is a date specified in a transaction agreement on which all requirements in the transaction agreement are expected to be completed, exclusive of any contingencies specified in the agreement.

“Exported Electricity” means electricity generated inside Pennsylvania and delivered to serve load located outside of Pennsylvania and outside of a state that does not have an External GHG ETS that is linked to the Pennsylvania Cap-and-Trade Program, as identified by GATS.

“External Greenhouse Gas Emissions Trading System” or “External GHG ETS” means an administrative system, other than the Pennsylvania Cap-and-Trade Program, that controls greenhouse gas emissions from sources in its program.

“Facility,” unless otherwise specified in relation to natural gas distribution facilities and petroleum and natural gas production facilities as defined in section 147.002(a), means:

Any physical property, plant, building, structure, source, or stationary equipment located on one or more contiguous or adjacent properties in actual physical contact or separated solely by a public roadway or other public right-of-way and under common ownership or common control, that emits or may emit any greenhouse gas. Operators of military installations may classify such installations as more than a single facility based on distinct and independent functional groupings within contiguous military properties.

With respect to natural gas distribution, “Facility” means the collection of all distribution pipelines and metering-regulating stations that are operated by a Local Distribution Company (LDC) within Pennsylvania that is regulated as a separate operating company by the Public Utility Commission or that are operated as an independent municipally-owned distribution system.

With respect to petroleum and natural gas production, “Facility” means all petroleum and natural gas equipment on a well-pad, or associated with a well pad or to which emulsion is transferred and CO₂ EOR operations that are under common ownership or common control including leased, rented, or contracted activities by a petroleum and natural gas production owner or operator and that are located in a single hydrocarbon basin. When a commonly owned cogeneration plant is within the hydrocarbon basin, the cogeneration plant is only considered part of the petroleum and natural gas production facility if the petroleum and natural gas production facility operator or owner has a greater than fifty percent ownership share in the cogeneration plant. Where a person or entity owns or operates more than one well in a basin, then all

petroleum and natural gas production equipment associated with all wells that the person or entity owns or operates in the basin would be considered one facility.

Natural gas processing equipment that is owned and/or operated by the facility owner/operator and located within the same basin, is considered “associated with a well pad” and is included with the petroleum and natural gas production facility, unless such equipment is required to be reported as part of a separate petroleum and natural gas processing facility.

With respect to natural gas processing, “Facility” means equipment associated with the separation of natural gas liquids (NGLs) or non-methane gases from produced natural gas, including separation of sulfur and carbon dioxide, that processes an annual average throughput of 25 MMscf per day or greater, or whose owner/operator does not also own/operate a production facility in the same air basin.

“Final Point of Delivery” means the point at which title and risk of loss pass from the seller to the buyer of electricity.

“First Deliverer of Electricity” or “First Deliverer” means the owner or operator of an electricity generating facility in Pennsylvania or an electricity importer.

“First Point of Receipt” means the generation source specified by GATS.

“Flash Point” of a volatile liquid is the lowest temperature at which it can vaporize to form an ignitable mixture in air.

“Fluorinated Greenhouse Gas” means sulfur hexafluoride (SF₆), nitrogen trifluoride (NF₃), and any fluorocarbon except for controlled substances as defined at 40 CFR Part 82, subpart A and substances with vapor pressures of less than 1 mm of Hg absolute at 25 C. With these exceptions, “fluorinated GHG” includes any hydrofluorocarbon; any perfluorocarbon; any fully fluorinated linear, branched, or cyclic alkane, ether, tertiary amine, or amino ether; any perfluoropolyether; and any hydrofluoropolyether.

“Forest Buffer Account” means a holding account for DEP offset credits issued to forest offset projects. It is used as a general insurance mechanism against unintentional reversals, for all forest offset projects listed under a Compliance Offset Protocol.

“Forest Offset Project” means an offset project that uses or has used either of the offset protocols identified in section 147.273(a)(2)(C)4.

“Forest Owner” means the owner of any interest in the real (as opposed to personal) property involved in a forest offset project, excluding government agency third party beneficiaries of conservation easements. Generally, a Forest Owner is the owner in fee of the real property involved in a forest offset project. In some cases, one entity may be the owner in fee while another entity may have an interest in the trees or the timber on the property, in which case all entities or individuals with interest in the real property are collectively considered the Forest Owners, however, a single Forest Owner must be identified as the Offset Project Operator.

“Fossil Fuel” means natural gas, petroleum, coal, or any form of solid, liquid, or gaseous fuel derived from such material for the purpose of creating useful heat.

“Fuel Analytical Data” means data collected about fuel usage (including mass, volume, and flow rate) and fuel characteristics (including heating value, carbon content, and molecular weight) to support emissions calculation.

“Fuel Cell” means a device that converts the chemical energy of a fuel and an oxidant directly into electrical energy without using combustion. Fuel cells require a continuous source of fuel and oxidant to operate.

“Fuel supplier” means a supplier of petroleum products, a supplier of biomass-derived transportation fuels, a supplier of natural, a supplier of liquefied natural gas, or a supplier of liquefied petroleum gas as specified in the MRR.

“Fugitive Emissions” means those emissions which are unintentional and could not reasonably pass through a stack, chimney, vent, or other functionally-equivalent opening.

“Full Offset Verification” means, for the purposes of this chapter, offset verification services that meet all the requirements of sections 147.277.1 and 147.277.2, including a site visit.

“Gas” means the state of matter distinguished from the solid and liquid states by: relatively low density and viscosity; relatively great expansion and contraction with changes in pressure and temperature; the ability to diffuse readily; and the spontaneous tendency to become distributed uniformly throughout any container.

“Gaseous Hydrogen” means hydrogen in a gaseous state.

“GATS” or the “Generation Attribute Tracking System” means the system applied by PJM to track attributes of electricity generation where the electricity is delivered within the PJM system, including emissions associated with the generation of the electricity, the location of the generation and surrender of allowances for such generation.

“Geologic Sequestration” means the process of injecting CO₂ captured from an emissions source into deep subsurface rock formations for permanent storage or disposal.

“Global Warming Potential” or “GWP” means the ratio of the time-integrated radiative forcing from the instantaneous release of one kilogram of a trace substance relative to that of one kilogram of a reference gas, *i.e.*, CO₂.

“Greenhouse Gas” or “GHG” means carbon dioxide (CO₂), methane (CH₄), nitrogen trifluoride (NF₃), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other fluorinated greenhouse gases as defined in this section.

“Greenhouse Gas Emission Reduction” or “GHG Emission Reduction” or “Greenhouse Gas Reduction” or “GHG Reduction” means a calculated decrease in GHG emissions relative to a project baseline over a specified period of time.

“Greenhouse Gas Emissions Source” or “GHG Emissions Source” means, in the context of offset credits, any type of emitting activity that releases greenhouse gases into the atmosphere.

“Greenhouse Gas Removal” or “GHG Removal” means the calculated total mass of a GHG removed from the atmosphere over a specified period of time.

“Greenhouse Gas Removal Enhancement” or “GHG Removal Enhancement” means a calculated increase in GHG removals relative to a project baseline.

“Greenhouse Gas Reservoir” or “GHG Reservoir” means a physical unit or component of the biosphere, geosphere, or hydrosphere with the capability to store, accumulate, or release a GHG removed from the atmosphere by a GHG sink or a GHG captured from a GHG emission source.

“Greenhouse Gas Sink” or “GHG Sink” means a physical unit or process that removes a GHG from the atmosphere.

“HD-5” or “Special Duty Propane” means a consumer grade of liquefied petroleum gas containing a minimum of 90% propane, a maximum of 5% propylene, and a maximum of 5% butane as specified in ASTM D1835-05.

“HD-10” means a fuel that meets the specifications for propane used in transportation fuel.

“Hold” in the context of a compliance instrument, means to have the serial number assigned to that instrument registered into an account assigned to an entity that is registered into the Pennsylvania Cap-and-Trade Program or an External Greenhouse Gas Emissions Trading System to which Pennsylvania has linked its Cap-and-Trade Program pursuant to subchapter 12, or an account under the control of the Department.

“Holding Account” or “General Holding Account” means an account created for each covered entity, opt-in covered entity, or voluntarily associated entity to hold compliance instruments.

“Hydrocarbon” means a chemical compound containing predominantly carbon and hydrogen.

“Hydrofluorocarbon” or “HFC” means a class of GHGs consisting of hydrogen, fluorine, and carbon.

“Hydrogen” means diatomic molecular hydrogen, the lightest of all gases.

“Imported Electricity” means electricity generated outside Pennsylvania and delivered to serve load located inside Pennsylvania.

“Importer of fuel” means an entity that imports fuel into Pennsylvania and who is the importer of record under federal customs law. For imported fuel not subject to federal customs law, the “importer of fuel” is the owner of the fuel upon its entering into Pennsylvania if the eventual transfer of ownership of the product to an end user or marketer located in Pennsylvania occurs at a location inside Pennsylvania. However, where the transfer of ownership of the product fuel to a Pennsylvania end user or marketer occurs at a location outside Pennsylvania, the “importer of fuel” is the producer, marketer, or distributor that is the seller of the fuel the end user or marketer located inside Pennsylvania.

“Initial Crediting Period” means, for any project, the crediting period that begins with the date that the first GHG emission reductions or GHG removal enhancements took place according to the first Positive Offset or Qualified Positive Offset Verification Statement that is received by DEP.

“Intentional Reversal” means any reversal, except as provided below, which is caused by a forest owner’s negligence, gross negligence, or willful intent, including harvesting, development, and harm to the area within the offset project boundary, or caused by approved growth models overestimating carbon stocks. A reversal caused by an intentional back burn set by, or at the request of, a local, state, or federal fire protection agency for the purpose of protecting forestlands from an advancing wildfire that began on another property through no negligence, gross negligence, or willful misconduct of the forest owner is not considered an intentional reversal but, rather, an unintentional reversal. Receiving Adverse Offset Verification Statements on two consecutive offset verifications after the end of the final crediting period will be considered an intentional reversal.

“Interstate Pipeline” means any entity that owns or operates a natural gas pipeline delivering natural gas to consumers in Pennsylvania and is subject to rate regulation by the Federal Energy Regulatory Commission.

“Intrastate Pipeline” means any pipeline or piping system wholly within Pennsylvania that is delivering natural gas to end-users and is not regulated as a public utility gas corporation by the Pennsylvania Public Utility Commission (PUC), is not a publicly owned natural gas utility, and is not regulated as an interstate pipeline by the Federal Energy Regulatory Commission. This definition includes petroleum and natural gas production facilities and natural gas processing facilities that deliver pipeline and/or non-pipeline quality natural gas to one or more end users. Facility operators that operate an interconnection pipeline that connects their facility to an interstate pipeline, or that share an interconnection pipeline to an interstate pipeline with other nearby facilities, are not considered intrastate pipeline operators. Facilities that receive gas from an upstream LDC and redeliver a portion of the gas to one or more adjacent facilities are not considered intrastate pipelines.

“Inventory Position” means a contractual agreement with the terminal operator for the use of the storage facilities and terminaling services for the fuel.

“Issue” or “Issuance” means, in the context of offset credits, the creation of DEP offset credits or registry offset credits equivalent to the number of verified GHG reductions or GHG removal enhancements for an offset project over a specified period of time. In the context of allowances, issue means the placement of an allowance into an account under the control of the Department.

“Kerosene” is a light petroleum distillate with a maximum distillation temperature of 400 F at the 10-percent recovery point, a final maximum boiling point of 572 F, a minimum flash point of 100 F, and a maximum freezing point of -22 F. Included are No. 1-K and No. 2-K, distinguished by maximum sulfur content (0.04 and 0.30 percent of total mass, respectively), as well as all other grades of kerosene called range or stove oil. Kerosene does not include kerosene-type jet fuel.

“Kerosene-Type Jet Fuel” means a kerosene-based product used in commercial and military turbojet and turboprop aircraft. The product has a maximum distillation temperature of 400 °F at the 10 percent recovery point and a final maximum boiling point of 572 °F. Included are Jet A, Jet A-1, JP-5, and JP-8.

“Lead Verifier” means, for purposes of this chapter, a person that has met all of the requirements in this chapters for verifying offsets and who may act as the lead verifier of an offset verification team providing offset verification services or as a lead verifier providing an independent review of offset verification services rendered.

“Lead Verifier Independent Reviewer” or “Independent Reviewer” means, for purposes of this chapter, a lead verifier within a verification body who has not participated in conducting offset verification services for an Offset Project Developer or Authorized Project Designee for the current Offset Project Data Report and who provides an independent review of offset verification services rendered for an Offset Project Developer or Authorized Project Designee as required in section 147.277.1(b)(3)(R). The independent reviewer is not required to also meet the requirements for a sector specific or offset project specific verifier.

“Less Intensive Verification” means, for the purposes of this chapter, the offset verification services provided in interim years between full offset verifications of an Offset Project Data Report; less intensive verification of an Offset Project Data Report only requires data checks and document reviews of an Offset Project Data Report based on the analysis and

risk assessment in the most current sampling plan developed as part of the most recent full offset verification services. This level of verification may only be used if the offset verifier can provide findings with a reasonable level of assurance.

“Linkage” means the approval of compliance instruments from an external greenhouse gas emission trading system (GHG ETS) to meet compliance obligations under this chapter (including approval by rule_, and the reciprocal approval of compliance instruments issued by Pennsylvania to meet compliance obligation in an external GHG ETS, unless reciprocal approval is not required as provided in this chapter

“Liquefied natural gas” or “LNG” means natural gas (primarily methane) that has been liquefied by reducing its temperature to -260 degrees Fahrenheit at atmospheric pressure.

“Liquefied Petroleum Gas” or “LPG” means a flammable mixture of hydrocarbon gases used as a fuel. LPG is primarily mixtures of propane, butane, propene (propylene) and ethane. The most common specification categories are propane grades HD-5, HD-10, and commercial grade propane. LPG also includes both odorized and non-odorized liquid petroleum gas, and is also referred to as propane.

“Liquid Hydrogen” means hydrogen in a liquid state.

“Long-Term Contract” means a contract for the delivery of electricity entered into before [the date of approval of this chapter as a proposal by the EQB], for the term of five years or more.

“Mandatory Reporting Regulation” or “MRR” means the Regulation for the Mandatory Reporting of Greenhouse Gas Emissions as set forth in this chapter.

“Market Index” means any published index of quantities or prices based on results of market transactions.

“Market-Shifting Leakage,” in the context of an offset project, means increased GHG emissions or decreased GHG removals outside an offset project’s boundary due to the effects of an offset project on an established market for goods or services.

“Marketer” means a purchasing-selling entity that delivers electricity and is not a retail provider.

“Methane” or “CH₄” means a GHG consisting on the molecular level of a single carbon atom and four hydrogen atoms.

“Metric Ton” or “MT” means a common international measurement for mass, equivalent to 2,204.6 pounds or 1.1 short tons.

“Monitoring” means, in the context of offset projects, the ongoing collection and archiving of all relevant and required data for determining the project baseline, project emissions, and quantifying GHG reductions or GHG removal enhancements that are attributable to the offset project.

“Municipal Solid Waste” or “MSW” means shall have the definition provided in the Pennsylvania Solid Waste Management Act, 35 P.S. § 6018.101 *et seq.* and implementing regulations.

“Natural Gas” means a naturally occurring mixture or process derivative of hydrocarbon and non-hydrocarbon gases found in geologic formations beneath the earth’s surface, the constituents of which include methane, heavier hydrocarbons, and carbon dioxide. Natural gas may be field quality (which varies widely) or pipeline quality. For the purposes of this rule, the definition of natural gas includes similarly constituted fuels such as field production gas, process gas, and fuel gas.

“Natural Gas Liquids” or “NGLs”, means those hydrocarbons in natural gas that are separated from the gas as liquids through the process of absorption, condensation, adsorption, or other methods. Natural gas liquids can be classified according to their vapor pressures as low (condensate), intermediate (natural gasoline), and high (liquefied petroleum gas) vapor pressure. Generally, such liquids consist of ethane, propane, butanes, pentanes, and higher molecular weight hydrocarbons. Bulk NGLs refers to mixtures of NGLs that are sold or delivered as undifferentiated product from natural gas processing plants.

“Natural gas supplier” or “supplier of natural gas” means any entity that distributes or directly uses natural gas in Pennsylvania and is described below:

- (A) A public utility gas corporation operating in Pennsylvania;
- (B) A municipally-owned natural gas utility operating in Pennsylvania;
- (C) A non-utility gas marketer that sells commodity gas directly to end users; or

(D) An end-user that uses natural gas directly from the well.

“Non-exempt Biomass derived CO₂” means CO₂ emissions resulting from the combustion of fuel not listed under section 147.152.2(a), or that is not verifiable under the MRR.

“Non-thermal enhanced oil recovery” or “non-thermal EOR” means the process of using methods other than thermal EOR, which may include water flooding or CO₂ injection, to increase the recovery of crude oil from a reservoir.

“Notice of Delegation” means a formal notice used to delegate authority to make an electronic submission to the accounts administrator.

“Offset Material Misstatement” means a discrepancy, omission, misreporting, or aggregation of the three, identified in the course of offset verification services that leads an offset verification team to believe that an Offset Project Data Report contains errors resulting in an overstatement of the reported total GHG emission reductions or GHG removal enhancements greater than 5.00 percent. Discrepancies, omissions, or misreporting, or an aggregation of the three, that result in an understatement of total reported GHG emission reductions or GHG removal enhancements in the Offset Project Data Report is not an offset material misstatement.

“Offset Project” means all equipment, materials, items, or actions that are directly related to or have an impact upon GHG reductions, project emissions, or GHG removal enhancements within the offset project boundary.

“Offset Project Boundary” is defined by and includes all GHG emission sources, GHG sinks or GHG reservoirs that are affected by an offset project and under control of the Offset Project Operator or Authorized Project Designee. The project boundary must be contiguous with the project area for a forestry project. GHG emissions sources, GHG sinks or GHG reservoirs not under control of the Offset Project Operator or Authorized Project Designee are not included in the offset project boundary.

“Offset Project Commencement” means, unless otherwise specified in a Compliance Offset Protocol, the date of the beginning of construction, work, or installation for an offset project involving physical construction, other work at an offset project site, or installation of equipment or materials. For an offset project that involves the implementation of a management

activity, “offset project commencement” means, unless otherwise specified in a Compliance Offset Protocol, the date on which such activity is first implemented.

“Offset Project Data Report” means the report prepared by an Offset Project Operator or Authorized Project Designee each Reporting Period that provides the information, documentation, and attestations required by this chapter or a Compliance Offset Protocol. An unattested report is not a valid Offset Project Data Report, and therefore will not satisfy any deadlines regarding submittal of an Offset Project Data Report.

“Offset Project Listing” or “Listing” means the information, documentation and attestations required by this chapter or a Compliance Offset Protocol that an Offset Project Operator or Authorized Project Designee has submitted to DEP or an Offset Project Registry, that has been reviewed for completeness by DEP and/or the Offset Project Registry and publicly listed by DEP or the Offset Project Registry for an initial or renewed crediting period. An Offset Project Listing must include the attestations required by Subchapter 13 of this chapter in order to be considered complete by DEP or the Offset Project Registry.

“Offset Project Operator” means the entity or entities with legal authority to implement the offset project. Only a Primary Account Representative or Alternate Account Representative, as defined in this chapter, may sign Listing documents, an Offset Project Data Report, a Request for Issuance, or attestations on behalf of the Offset Project Operator.

“Offset Project Registry” means an entity that meets the requirements of section 147.286 and is approved by DEP that lists offset projects, collects Offset Project Data Reports, facilitates verification of Offset Project Data Reports, and issues registry offset credits for offset projects being implemented using a Compliance Offset Protocol.

“Offset Protocol” means a documented set of procedures and requirements to quantify ongoing GHG reductions or GHG removal enhancements achieved by an offset project and calculate the project baseline. Offset protocols specify relevant data collection and monitoring procedures, emission factors, and conservatively account for uncertainty and activity-shifting and market-shifting leakage risks associated with an offset project.

“Offset Verification” means a systematic, independent, and documented process for evaluation of an Offset Project Operator’s or Authorized Project Designee’s Offset Project Data

Report against DEP's Compliance Offset Protocols and this chapter for calculating and reporting project baseline emissions, project emissions, GHG reductions, and GHG removal enhancements.

“Offset Verification Services” means services provided during offset verification as specified in sections 147.277.1 and 147.277.2, including reviewing an Offset Project Operator's or Authorized Project Designee's Offset Project Data Report, verifying its accuracy according to the standards specified in this chapter and applicable Compliance Offset Protocol, assessing the Offset Project Operator's or Authorized Project Designee's compliance with this chapter and applicable Compliance Offset Protocol, and submitting an Offset Verification Statement to DEP or an Offset Project Registry. For purposes of this chapter, Offset Verification Services begin with the Planning Meeting and end with the issuance of DEP offset credits, and do not include preliminary planning activities such as scheduling meetings and site visits, or preparing contract documents.

“Offset Verification Statement” means the final statement rendered by a verification body attesting whether an Offset Project Operator's or Authorized Project Designee's Offset Project Data Report is free of an offset material misstatement, and whether the Offset Project Data Report conforms to the requirements of this chapter and applicable Compliance Offset Protocol, and containing the attestations required pursuant to this chapter.

“Offset Verification Team” means all of those working for a verification body, including all subcontractors, to provide offset verification services for an Offset Project Operator or Authorized Project Designee.

“On-purpose hydrogen gas” means molecular hydrogen gas produced as a result of a process or processes dedicated to producing hydrogen, including, without limitation, steam methane reforming and electrolysis.

“Operational Control” for a facility subject to this chapter means the authority to introduce and implement operating, environmental, health, and safety policies. In any circumstance where this authority is shared among multiple entities, the entity holding the air permit is considered to have operational control for purposes of this chapter.

“Operator” means the entity, including an owner, having operational control of a facility, and shall include any operator listed on a permit.

“Opt-in Covered Entity” means an entity that meets the requirements of 147.111 that does not exceed the inclusion thresholds set forth in section 147.112 and may elect to voluntarily opt-in to the Cap-and-Trade Program and be willing to be subject to the requirements set forth in this chapter.

“Over-the-Counter” means the trading of carbon compliance instruments, contracts, or other instruments not executed or entered for clearing on any exchange.

“Ozone Depleting Substances” or “ODS” means a compound that contributes to stratospheric ozone depletion.

“Pennsylvania Greenhouse Gas Emissions Allowance” or “PA GHG Allowance” means an allowance issued by DEP and equal to up to one metric ton of CO₂ equivalent.

“Perfluorocarbons” or “PFCs” means a class of greenhouse gases consisting on the molecular level of carbon and fluorine.

“Permanent” means, in the context of offset credits, either that GHG reductions and GHG removal enhancements are not reversible, or when GHG reductions and GHG removal enhancements may be reversible, that mechanisms are in place to replace any reversed GHG emission reductions and GHG removal enhancements to ensure that all credited reductions endure for at least 100 years.

“Permanent Retirement Registry” means the publicly available registry in which the Department will record the retired compliance instruments.

“Petroleum” means oil removed from the earth and the oil derived from tar sands, and/or shale.

“Petroleum Refinery” or “Refinery” means any facility engaged in producing gasoline, gasoline blending stocks, naphtha, kerosene, distillate fuel oils, residual fuel oils, lubricants, or asphalt (bitumen) through distillation of petroleum or through re-distillation, cracking, or reforming of unfinished petroleum derivatives.

“Pipeline Quality Natural Gas” means, for the purpose of calculating emissions under MRR, natural gas having a high heat value greater than 970 Btu/scf and equal to or less than 1,100 Btu/scf, and which is at least ninety percent (90%) methane by volume, and which is less than five percent (5%) carbon dioxide by volume.

“Point of Delivery” or “POD” means the point on an electricity transmission or distribution system where a deliverer makes electricity available to a receiver or available to serve load or where electricity is imported into Pennsylvania.

“Point of Receipt” or “POR” means the point on an electricity transmission or distribution system where an electricity receiver receives electricity from a deliverer.

“Position Holder” means an entity that holds an inventory position in motor vehicle fuel, ethanol, distillate fuel, biodiesel, or renewable diesel as reflected in the records of the terminal operator or a terminal operator that owns motor vehicle fuel or diesel fuel in its terminal. “Position holder” does not include inventory held outside of a terminal, fuel jobbers (unless directly holding inventory at the terminal), retail establishments, or other fuel suppliers not holding inventory at a fuel terminal.

“Positive Emissions Data Verification Statement” means a verification statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the covered emissions data in the submitted emissions data report is free of material misstatement and that the emissions data conforms to the requirements of MRR.

“Positive Offset Verification Statement” means an Offset Verification Statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the submitted Offset Project Data Report is free of an offset material misstatement and that the Offset Project Data Report conforms to the requirements of this chapter and applicable Compliance Offset Protocol.

“Positive Product Data Verification Statement” means a verification statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the covered product data in the submitted emissions data report is free of material misstatement and that the product data conforms to the requirements of MRR.

“Power” means electricity, except where the context makes clear that another meaning is intended.

“Proceeds” means monies generated as a result of an auction or from sales from the Allowance Price Containment Reserve.

“Process” means the intentional or unintentional reactions between substances or their transformation, including the chemical or electrolytic reduction of metal ores, the thermal decomposition of substances, mechanical transformation of substances, and the formation of substances for use as product or feedstock.

“Process Emissions” means the emissions from industrial processes (*e.g.*, cement production, ammonia production) involving chemical or physical transformations other than fuel combustion. For example, the calcination of carbonates in a kiln during cement production or the oxidation of methane in an ammonia process results in the release of process CO₂ emissions to the atmosphere. Emissions from fuel combustion to provide process heat are not part of process emissions, whether the combustion is internal or external to the process equipment.

“Process Unit” means the equipment assembled and connected by pipes, ducts, conveyers or other conveyances to process raw materials and to manufacture either a final or intermediate product used in the onsite production of other products. The process unit also includes the purification of recovered byproducts.

“Producer” means a person who owns leases, operates, controls, or supervises a Pennsylvania production facility.

“Product Data Verification Statement” means the final statement rendered by a verification body attesting whether a reporting entity’s product data in their covered emissions data report is free of material misstatement, and whether the product data conforms to the requirements of the MRR.

“Professional Judgment” means the ability to render sound decisions based on professional qualifications and relevant greenhouse gas accounting and auditing experience.

“Project Area” means the property associated with the geographic boundaries of a forest project, as defined following the requirements of the relevant protocol from section 147.273(a)(2)(C)4.

“Project Baseline” means, in the context of a specific offset project, a calculation or modeled estimate of the existing GHG emissions or reduction within the project boundary that is (i) based on three years of actual data for emissions of the type to be reduced or the capture of carbon to be enhanced from within the project boundary, or (ii), if such data is not available, modeled conservatively based on the known and quantified character of the relevant facilities or activities within the project boundary and the best available data with respect to comparable facilities or activities in the region where the project is located.

“Project Emissions” means any GHG emissions associated with the implementation of an offset project that must be accounted for in the Offset Project Data Report.

“Proof Gallons” means one liquid gallon of distilled spirits that is 50% alcohol at 60 degrees F.

“Propane” is a paraffinic hydrocarbon with molecular formula C_3H_8 .

“Property Right” means any type of right to specific property whether it is personal or real property, tangible or intangible.

“Purchase Limit” means the maximum percentage of allowances that may be purchased by an entity of a group of affiliated entities at an allowance auction.

“Purchasing-Selling Entity” or “PSE” means entity that is identified under GATS or a NERC e-TAG for each physical path segment.

“Qualified Positive Emissions Data Verification Statement” means a statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the covered emissions data in the submitted emissions data report is free of material misstatement and is in conformance with the of MRR, but the emissions data may include one or more other nonconformance(s) with requirements of MRR which do not result in a material misstatement.

“Qualified Positive Offset Verification Statement” means an Offset Verification Statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the submitted Offset Project Data Report is free of an offset material misstatement, but the Offset Project Data Report may include one or more nonconformance(s) with this chapter and the applicable Compliance Offset Protocol which do not result in an offset

material misstatement. Nonconformance, in this context, does not include disregarding the explicit requirements of this chapter or applicable Compliance Offset Protocol and substituting alternative requirements not approved by the Department.

“Qualified Positive Product Data Verification Statement” means a statement rendered by a verification body attesting that the verification body can say with reasonable assurance that the covered product data in the submitted emissions data report is free of material misstatement and is in conformance with the MRR, but the product data may include one or more other nonconformance(s) with the requirements of MRR which do not result in a material misstatement.

“Qualified Thermal Output” means the thermal energy generated by a cogeneration unit or district heating facility that is sold to particular end-users and reported pursuant to the MRR and the thermal energy used on-site by industrial processes or operations and heating and cooling operations that is not in support of or a part of the electricity generation or cogeneration system and is reported pursuant to the MRR. Qualified thermal output does not include thermal energy that is vented, radiated, wasted, or discharged before it is utilized at industrial processes or operations, or for a facility with a cogeneration unit, any thermal energy generated by equipment that is not an integral part of the cogeneration unit.

“Quantifiable” means, in the context of offset projects, the ability to accurately measure and calculate GHG reductions or GHG removal enhancements relative to a project baseline in a reliable and replicable manner for all GHG emission sources, GHG sinks, or GHG reservoirs included within the offset project boundary, while accounting for uncertainty and activity-shifting leakage and market-shifting leakage.

“Quantitative Usage Limit” means a limit on the percentage of an entity’s compliance obligation that may be met by surrendering offset credits or other compliance instruments designated to be subject to the limit under this chapter.

“Radiative Forcing” means the change in the net vertical irradiance at the atmospheric boundary between the troposphere and the stratosphere due to an internal change or a change in the external forcing of the climate system such as a change in the concentration of carbon dioxide or the output of the Sun.

“Real” means, in the context of offset projects, that GHG reductions or GHG enhancements result from a demonstrable action or set of actions, and are quantified using appropriate, accurate, and conservative methodologies that account for all GHG emissions sources, GHG sinks, and GHG reservoirs within the offset project boundary and account for uncertainty and the potential for activity-shifting leakage and market-shifting leakage.

“Reasonable Assurance” means a high degree of confidence that submitted data and statements are valid.

“Reference Level” means the quantity of GHG emission equivalents that have occurred during the normal course of business or activities during a designated period of time within the boundaries of a defined sector and a defined jurisdiction.

“Reformulated Gasoline Blendstock for Oxygenate Blending” or “RBOB” means unleaded gasoline.

“Register,” in the context of a compliance instrument, means the act of assigning the serial number of a compliance instrument into an account.

“Registrant” or “Registered Entity” means an entity that has completed the process for registration.

“Registry Offset Credit” means a credit issued by an Offset Project Registry for a GHG reduction or GHG removal enhancement of one metric ton of CO₂e. The GHG reduction or GHG removal enhancement must be real, additional, quantifiable, permanent, verifiable, and enforceable and may only be issued for offset projects using Compliance Offset Protocols. Pursuant to section 147.281.1, DEP may determine that a registry offset credit may be removed, retired, or cancelled from the Offset Project Registry system and issued as a DEP offset credit.

“Registry Services” means all services provided by a DEP approved Offset Project Registry as specified in section 147.287.

“Regulatory Compliance” means fulfilling all local, regional, state, and national environmental and health and safety laws and regulations that apply based on the offset project location and that directly apply to the offset project, including as specified in a Compliance Offset Protocol.

“Renewable diesel” means a motor vehicle fuel or fuel additive that is all of the following: registered as a motor vehicle fuel or fuel additive under 40 CFR Part 79; not a mono-alkyl ester; intended for use in engines that are designed to run on conventional diesel fuel; and derived from nonpetroleum renewable resources.

“Renewable Energy” means energy from sources that constantly renew themselves or that are regarded as practically inexhaustible. Renewable energy includes energy derived from solar, wind, geothermal, hydroelectric, wood, biomass, tidal power, sea currents, and ocean thermal gradients.

“Renewable Energy Credit” or “REC” shall mean an alternative energy credit or “AEC” as defined in the Pennsylvania Alternative Energy Portfolio Standards Act or an equivalent instrument issued under the Renewable Portfolio Standard in any ETS program to which the Pennsylvania cap-and-trade program is linked.

“Renewable Liquid Fuels” means fuel ethanol, biomass-based diesel fuel, other renewable diesel fuel and other renewable fuels.

“Reporting Period” means, in the context of offsets, the period of time for which an Offset Project Operator or Authorized Project Designee quantifies and reports GHG reductions or GHG removal enhancements covered in an Offset Project Data Report. An offset project’s Reporting Period is established in the project listing documentation, but may be modified by notifying DEP in writing or by providing updated listing information with the submittal of the Offset Project Data Report. Modifications to the Reporting Period are only allowed if DEP is notified prior to any deadlines being missed. The first reporting period for an offset project in an initial crediting period may consist of 6 to 24 consecutive months; all subsequent reporting periods in an initial crediting period and all reporting periods in any renewed crediting period must consist of 12 consecutive months. For offset projects developed using the Compliance Offset Protocol in section 147.273(a)(2)(C)1., there may only be one Reporting Period per offset project. The Reporting Period may not be longer than 12 months and there is no minimum timeframe imposed for the Reporting Period. For offset projects developed using the compliance offset protocol in section 147.273(a)(2)(C)6., the Reporting Period is approximately 12 months; it may be less than or exceed 12 months.

“Reporting Year” means data year.

“Request for Issuance” refers to a request submitted by an Offset Project Operator or Authorized Project Designee to DEP seeking issuance of DEP offset credits based on an Offset Project Data Report, pursuant to the requirements of sections 147.281 and 147.281.1. A Request for Issuance must include the attestations required pursuant to this chapter.

“Reserve Price” see “Auction Reserve Price.”

“Reserve Sale Administrator” means the operator of sales from the Allowance Price Containment Reserve account, which may be the Department or an entity designated by the Department.

“Resource Shuffling” means any plan, scheme, or artifice undertaken by a First Deliverer of Electricity to substitute electricity deliveries from sources with relatively lower emissions for electricity deliveries from sources with relatively higher emissions to reduce its emissions compliance obligation. Resource shuffling does not include substitution of electricity deliveries from sources with relatively lower emissions for electricity deliveries from sources with relatively higher emissions resources when the substitution occurs pursuant to the conditions listed in section 147.152(b)(2)(A).

“Retail Provider” means an entity that provides electricity to retail end users in Pennsylvania.

“Retire” or “Retired” or “Retirement” means that the serial number for a compliance instrument is registered into the Retirement Account under the control of the Department. Compliance instruments registered into this account cannot be removed.

“Reversal” means a GHG emission reduction or GHG removal enhancement for which an DEP offset credit or registry offset credit has been issued that is subsequently released or emitted back into the atmosphere, or that is later determined to have never occurred. A reversal is either intentional or unintentional.

“Secretary” means the Secretary of the Pennsylvania Department of Environmental Protection, or his or her delegate.

“Sector” or “Sectoral,” when used in conjunction with sector-based crediting programs, means a group or subgroup of an economic activity, or a group or cross-section of a group of economic activities, within a jurisdiction.

“Sector-Based Crediting Program” is a GHG emissions-reduction crediting mechanism established by a country, region, or subnational jurisdiction in a developing country and covering a particular economic sector within that jurisdiction. A program’s performance is based on achievement toward an emissions reduction target for the particular sector within the boundary of the jurisdiction.

“Sector-Based Offset Credit” means a credit issued from a sector-based crediting program once the crediting baseline for a sector has been reached.

“Self-Generation of Electricity” means electricity dedicated to serving an electricity user on the same location as the generator. The system may be operated directly by the electricity user or by an entity with a contractual arrangement.

“Serial Number” means a unique number assigned to each compliance instrument for identification.

“Sequestration” means the removal and storage of carbon from the atmosphere in GHG sinks or GHG reservoirs through physical or biological processes.

“Source” means greenhouse gas source; or any physical unit, process, or other use or activity that releases a greenhouse gas into the atmosphere.

“Specified Source of Electricity” or “Specified Source” means a facility or unit which is permitted to be claimed as the source of electricity delivered. The reporting entity must have either full or partial ownership in the facility/unit or a written power contract as defined in the MRR to procure electricity generated by that facility/unit. Specified facilities/units include cogeneration systems.

“Stand-Alone-Electricity Generating Facility” means an electricity generating facility whose primary business and sole industrial operation is electricity generation, and is not a cogeneration or bigeneration facility.

“Stationary” means neither portable nor self-propelled, and operated at a single facility.

“Supplier” means a producer, importer, exporter, position holder, marketer, or local distribution company of a fossil fuel or an industrial greenhouse gas.

“Thermal enhanced oil recovery” or “thermal EOR” means the process of using injected steam to increase the recovery of crude oil from a reservoir.

“Tracking System” means the Compliance Instrument Tracking System established by DEP to manage the issuance, trading, and retirement of compliance instruments.

“Transaction,” when referring to an arrangement between registered entities regarding compliance instruments, means an understanding among registered entities to transfer the registered ownership of a compliance instrument from one entity to another, either immediately or at a later date.

“Transfer” of a compliance instrument means the removal of a compliance instrument from one account and placement into another account.

“Transfer Request” means the communication by an authorized account representative or an alternate authorized account representative to the accounts administrator to register into the tracking system the transfer of allowances between accounts.

“Transferred DEP Project” means an offset project which has been transferred from DEP or one Offset Project Registry, where it was previously listed, to DEP or another Offset Project Registry. The entity to which the offset project is transferred will indicate the applicable offset project status from the following list: “Proposed Project,” “Active DEP Project,” “Active Registry Project,” “Proposed Renewal,” “Active DEP Renewal,” and “Active Registry Renewal.”

“True-up allowance amount” is a quantity of Pennsylvania GHG allowances allocated for changes in production or allocation not properly accounted for in prior allocations pursuant to 147.191(b), 147.191(c)(2)(B), or 147.194(c).

“Unintentional Reversal” means any reversal, including wildfires or disease that is not the result of the forest owner’s negligence, gross negligence, or willful intent. Only trees identified as dead or dying, in the post-event inventory, as a result of the wildfire or disease will be removed from the project’s inventory and compensated from the Forest Buffer Account minus any salvage harvest accounted for under long-term storage.

“Unspecified Source of Electricity” or “Unspecified Source” means a source of electricity that is not a specified source at the time of entry into the transaction to procure the electricity.

“Urban Forest Offset Project” means an offset project that uses or has used either the offset protocols identified in section 147.273(a)(2)(C)3.

“Vented Emissions” means intentional or designed releases of CH₄ or CO₂ containing natural gas or hydrocarbon gas (not including stationary combustion flue gas), including process designed flow to the atmosphere through seals or vent pipes, equipment blowdown for maintenance, and direct venting of gas used to power equipment (such as pneumatic devices).

“Verifiable” means that an Offset Project Data Report assertion is well documented and transparent such that it lends itself to an objective review by an accredited verification body.

“Verification Body” means a firm accredited by DEP, which is able to render an offset verification statement and provide offset verification services for Offset Project Operators or Authorized Project Designees subject to providing an Offset Project Data Report under this chapter.

“Verifier” or “offset verifier” means an individual accredited by DEP to carry out offset verification services as specified in sections 147.277.1 and 147.277.2.

“Vintage Year” means the budget year to which an individual Pennsylvanian GHG allowance is assigned pursuant to subchapter 6.

“Voluntarily Associated Entity” or “General Market Participant” means any entity which does not meet the requirements of section 147.111 or 147.113 in this chapter and that intends to purchase, hold, sell, or voluntarily retire compliance instruments or an entity operating an offset project.

“Voluntary Renewable Electricity” or “VRE” means electricity produced or RECs associated with electricity, produced by a voluntary renewable electricity generator, and which has not and will not be sold or used to meet any other mandatory requirements in Pennsylvania or any other jurisdiction.

“Voluntary Renewable Electricity Participant” or “VRE Participant” means a voluntary renewable electricity generator, a REC marketer, or entity that purchases voluntary renewable

electricity or RECs as an end-user or on behalf of an end-user and is seeking allowance retirement pursuant to section 147.141.1.

“Waste gas” means a natural gas that contains a greater percentage of gaseous chemical impurities than the percentage of methane. For purposes of this definition, gaseous chemical impurities may include carbon dioxide, nitrogen, helium, or hydrogen sulfide.

“Waste-to-Energy Facility” means a facility located in Pennsylvania that combusts eligible municipal or residual waste. The facility must operate in accordance with current air and solid water permits and generate and distribute electricity over the electric power grid for wholesale or retail customers of the grid located in Pennsylvania.

(b) The following acronyms apply:

“AEC” means alternative energy credit.

“AEPS” means the Alternative Energy Portfolio Standard.

“C” means Centigrade.

“CFR” means Code of Federal Regulations.

“CH₄” means methane.

“CO₂” means carbon dioxide.

“CO_{2e}” means carbon dioxide equivalent.

“Department” “DEP” or means the Pennsylvania Department of Environmental Protection.

“ETS” means Emission Trading System.

“F” means Fahrenheit.

“GHG” means greenhouse gas.

“GHG ETS” means greenhouse gas emissions trading system.

“GWP” means global warming potential.

“HFC” means hydrofluorocarbon.

“LPG” means liquefied petroleum gas.

“MMBtu” means one million British thermal units.

“MRR” means the Pennsylvania Department of Environmental Protection’s Regulation for the Mandatory Reporting of Greenhouse Gas Emissions.

“Mscf” means one thousand standard cubic feet.

“MWh” means megawatt-hour.

“MT” means metric tons.

“NAICS” means North American Industry Classification System.

“NGLs” means natural gas liquids.

“NERC” means North American Electric Reliability Corporation.

“N₂O” means “nitrous oxide.”

“PFC” means perfluorocarbon.

“PSE” or “Purchasing Selling Entity” means the entity that is identified on a NERC e-Tag for each physical path segment or otherwise identified by a similar PJM instrument.

“PUC” means the Public Utilities Commission.

“REC” means Renewable Energy Credit.

“REDD” means reducing emissions from deforestation and degradation.

“RPS” means a Renewable Portfolio Standard.

“SCF” means standard cubic foot.

“SF₆” means sulfur hexafluoride.

“TEAP” means the Technology and Economic Assessment Panel of the Montreal Protocol.

§ 147.003. Submittal of Required Information.

Different sections of this chapter identify information that must be submitted to DEP or maintained by the entity. The following general requirements apply to all information submissions unless otherwise specified:

(a) Information that is submitted electronically with electronic signatures, or by means other than original hardcopy with original handwritten signature, will have the same legal effect as if it were submitted in hardcopy form certified by a handwritten signature.

(b) Unless another deadline is specified, information requested by the Department must be submitted within 10 calendar days of the request.

Subchapter 2: Mandatory Reporting of Greenhouse Gases Regulation (“MRR”).

§ 147.100. Incorporation by Reference.

(a) The federal Mandatory Reporting of Greenhous Gases Regulation set forth in 40 C.F.R. Part 98 (“Federal MRR”) is incorporated herein by reference, subject to the modifications set forth in this subchapter.

(b) Each entity subject to the Federal MRR and all others entities described in section 147.111 shall report annual GHG emissions attributable to Pennsylvania sources and entities to the Department on the same schedule as established under the Federal MRR.

(c) All references to the Administrator in the Federal MRR shall be deemed to refer to the Department.

(d) To prevent double counting, each entity subject to this regulation shall report all entities from whom they acquire fossil fuel that they distribute or combust, the amounts of that fuel, the GHG emissions resulting from the combustion of the fuel, and the percentage of exempt biomass in the fuel.

(d) If any definition or other provision in the Federal MRR differs from that in this chapter, the definition or other provision of this chapter shall govern.

§ 147.101. Reporting and Surrender of Allowances by Electricity Distribution Companies.

(a) Each electricity distribution company distributing electricity in Pennsylvania shall report the amount of electricity distributed in Pennsylvania, the sources of the electricity and the emissions attributable to each source electricity.

(b) The electricity distribution company shall be required to submit allowances equal to the emissions attributable to all electricity that is not generated in Pennsylvania or a jurisdiction with an ETS linked to the Pennsylvania cap and trade program under this chapter.

(c) The electricity distribution company shall not be required to surrender any allowances for electricity generated within Pennsylvania or a jurisdiction with an ETS linked to the Pennsylvania cap and trade program under this chapter, provided however, that the electricity

distribution company shall be required to surrender allowances if neither generation source in a linked jurisdiction nor its fuel supplier is required to surrender allowances.

(d) If the electricity distribution company is unable to identify the source of generation and the emissions, the electricity generation company shall surrender allowances equal to 2200 pounds of carbon dioxide per megawatt hour.

(e) If the PJM Interconnection adopts a carbon adder program where (1) a carbon adder is included in the bid from each generator located in a jurisdiction that does not have an ETS linked to the Pennsylvania cap-and-trade program, and (2) the carbon adder is equal to the greater of the reserve price for the Pennsylvania auction or the price of allowances in the most recent Pennsylvania auction, then electricity distributors shall not be required to surrender allowances under this section. If the PJM Interconnect adopts such a program, the Department shall reduce the cap by the number of allowances attributable to electricity generated by jurisdictions not linked to the Pennsylvania cap and trade program.

§ 147.102. Exceptions

(a) Any source category may apply to the Department for a revision to the method for measuring and reporting GHG emissions. The application must include a description of why the change in method is being proposed, include a detailed description of the data that are affected by the alternative measurement method, and include a demonstration of differences in estimated data under the current and proposed methods. The Department will make an approval determination based on the necessity of the alternative method and whether the accuracy of the method can be sufficiently demonstrated during verification.

(b) Any source that emits fewer than 25,000 metric tons of CO₂e per year and receives fossil fuel from a supplier that is also required to report GHG emissions under this Chapter may apply to the Department for an exemption, in which case the supplier shall report the emissions and surrender allowances. Any such application shall be filed jointly by the source and the supplier.

§ 147.103. Initial GHG Baseline Report

(a) Each entity subject to the requirements of this chapter shall file its Initial GHG Baseline Report no later than sixty (60) days after publication of this rule as a final rule in the

Pennsylvania Bulletin. The Department will use the data submitted with all the Initial GHG Baseline Report to calculate the initial 2016 baseline budget and subsequent budgets based on that baseline.

(b) For entities that report under the federal MRR, the Initial GHG Baseline Report shall report all emissions reported in the entity's report to EPA under the federal MRR associated with sources within Pennsylvania. Sources within Pennsylvania shall be deemed to include the first distribution of fossil fuels required to report within Pennsylvania.

(c) Entities that were not required to report under the Federal MRR shall provide their best estimate of emissions in 2016 that would have been subject to this chapter.

(d) If any entity fails to report as required hereunder, the Department will make an estimate of its 2016 emissions. That estimate shall be replaced with emissions reported in the first report of annual emissions submitted hereunder.

§ 147.104 Initial Annual Report

(a) Each entity subject to the requirements of this chapter shall file their first annual GHG emissions report at the same time as the first annual report must be filed under the Federal MRR following the publication of this chapter as a final regulation in the Pennsylvania Bulletin.

(b) The initial annual report shall apply to emissions during the calendar year in which this chapter is first published as a final regulation in the Pennsylvania Bulletin.

§ 147.104 Effect of Potential Stay or Delay in the Effective Date of this Chapter.

The intent of this subchapter is to provide information vital to regulation of GHG emission in this Commonwealth. The reporting obligations in this subchapter shall apply regardless of any stay or delay of the other portions of this chapter, unless otherwise specifically and unambiguously provided in the stay or authority establishing a stay.

Subchapter 3: Applicability.

This chapter applies to all entities identified in this subchapter.

§ 147.110. Covered Gases.

This chapter applies to the following greenhouse gases: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), nitrogen trifluoride (NF₃), and other fluorinated greenhouse gases.

§ 147.111. Covered Entities.

This chapter applies to all of the following entities with associated GHG emissions pursuant to section 147.112:

(a) Operators of Facilities. The operator of a facility within Pennsylvania that has one or more of the following processes or operations:

- (1) Cement production;
- (2) Cogeneration;
- (3) Glass production;
- (4) Hydrogen production;
- (5) Iron and steel production;
- (6) Lead Production;
- (7) Lime manufacturing;
- (8) Nitric acid production;
- (9) Petroleum and natural gas systems, as specified in section 147.152(h);
- (10) Petroleum refining;
- (11) Pulp and paper manufacturing;
- (12) Self-generation of electricity; or
- (13) Stationary combustion.
- (14) Coal mining.

(b) First Deliverers of Electricity.

(1) Electricity generating facilities: the operator of an electricity generating facility located in Pennsylvania; or

(2) Electricity importers.

(c) Suppliers of Natural Gas. An entity that sells or uses natural gas in Pennsylvania as described below:

(1) A public utility gas corporation operating in Pennsylvania;

(2) A municipally-owned natural gas utility operating in Pennsylvania; or

(3) A non-utility gas marketer that sells directly to end users; or

(4) Any entity that obtains gas directly from the well.

(d) Suppliers of RBOB and Distillate Fuel Oil. A position holder of one or more of the following fuels, or an enterer that imports one or more of the following fuels into Pennsylvania outside the bulk transfer/terminal system:

(1) RBOB;

(2) Distillate Fuel Oil No. 1; or

(3) Distillate Fuel Oil No. 2.

(e) Suppliers of Liquefied Petroleum Gas.

(1) The operator of a refinery that produces liquefied petroleum gas in Pennsylvania;

(2) The operator of a facility that fractionates natural gas liquids to produce liquefied petroleum gas; or

(3) An importer of liquefied petroleum gas into Pennsylvania as defined under MRR.

(f) Sections 147.111(c), (d), and (e) apply to suppliers of blended fuels that contain the fuels listed above.

(g) Suppliers of Liquefied Natural Gas and Compressed Natural Gas.

(1) Facilities that make liquefied natural gas products or compressed natural gas products by liquefying or compressing natural gas received from interstate or intrastate pipelines; and

(2) Importers of liquefied natural gas and compressed natural gas.

(h) Carbon dioxide suppliers.

(i) Coal suppliers.

§ 147.112. Inclusion Thresholds for Covered Entities.

(a) The inclusion threshold for each covered entity is based on the subset of greenhouse gas emissions that generate a compliance obligation for that entity as specified in section 147.152. The entity must report and verify annual emissions pursuant to the MRR.

(b) If an entity's reported or reported and verified annual emissions in any data year from 2010 through 2016 from the categories specified in section 147.152(a) or (b) equal or exceed the thresholds identified below, that entity is classified as a covered entity as of January 1, 2018, and for all future years until any requirement set forth in section 147.135(c) is met.

(c) The requirements apply as follows:

(1) Operators of Facilities. The applicability threshold for a facility is 25,000 metric tons or more of CO₂e per data year.

(2) First Deliverers of Electricity.

(A) Electricity Generating Facilities. The applicability threshold for an electricity generating facility is based on the annual emissions from which the electricity originated. The applicability threshold for an electricity generating facility is 25,000 metric tons or more of CO₂e per data year.

(B) Electricity importers. The applicability threshold for an electricity importer is based on the annual emissions from each of the electricity importer's sources of delivered electricity.

1. All emissions reported for imported electricity from specified sources of electricity that emit 25,000 metric tons or more of CO₂e per year are considered to be above the threshold.

2. All emissions reported for imported electricity from unspecified sources are considered to be above the threshold.

(3) Carbon Dioxide Suppliers. The applicability threshold for a carbon dioxide supplier is 25,000 metric tons or more of CO₂e per year. For purpose of comparison to this threshold, the supplier must include the sum of the CO₂ that it captures from its production process units for purposes of supplying CO₂ for commercial applications or that it captures from a CO₂ stream to utilize for geologic sequestration, and the CO₂ that it extracts or produces from a CO₂ production well for purposes of supplying for commercial applications or that it extracts or produces to utilize for geologic sequestration.

(4) Petroleum and Natural Gas Facilities. The applicability threshold for a petroleum and natural gas facility is 25,000 metric tons or more of CO₂e per data year. This threshold is applied for each facility type specified in section 147.152(h).

(5) Coal facilities. All facilities must report without reference to a threshold.

(d) If an entity's annual, assigned, or reported and verified emissions from any data year between 2010-2016 equal or exceed the thresholds identified below from the categories specified in sections 147.151(a), (b), and (d) then that entity is classified as a covered entity as of January 1, 2018, for the year in which the threshold is reached and for all future years until all requirements set forth in section 147.135 are met.

(1) Fuel Suppliers. The threshold for a fuel supplier is 25,000 metric tons or more of CO₂e annually of GHG emissions that would result from full combustion or oxidation of the quantities of the fuels, identified in section 147.111(c) through (g), which are imported and/or delivered to Pennsylvania.

(2) Electricity importers. The threshold for an electricity importer of specified source of electricity is zero metric tons of CO₂e per year and for unspecified sources is zero MWhs per year as of January 1, 2018.

(3) Waste-to-Energy-Facilities. If a waste-to-energy facility's annual, assigned, or reported and verified emissions from any data year between 2010-2016 equal or exceed 25,000 metric tons or more of CO₂e annually, then that entity is classified as a covered entity as of

January 1, 2018, for the year in which the threshold is reached and for all years until the requirement set forth in section 147.112(e) is met.

§ 147.113. Opt-In Covered Entities.

(a) An entity that meets the requirements of section 147.111 but does not exceed the inclusion thresholds set forth in section 147.112 may elect to voluntarily opt-in to the Cap-and-Trade Program.

(b) An entity that does not qualify to opt into the Program pursuant to section 147.113(f) and that voluntarily elects to participate in this program under this section must submit its request to the Department for approval by March 1 of the calendar year immediately preceding the first year in which it voluntarily elects to be subject to a compliance obligation pursuant to this section. The request for approval to be an opt-in covered entity shall specify the first year in which the entity elects to be subject to a compliance obligation. The Department shall evaluate such applications, designate approved applicants as opt-in covered entities, and, for approved applicants, specify the first year in which the opt-in covered entity will be subject to a compliance obligation.

(c) An entity that voluntarily elects to participate in this program under section 147.113(b) may rescind its request to opt in to the program by October 1 of the calendar year prior to the first year in which it voluntarily elects to be subject to a compliance obligation pursuant to section 147.113. An entity that voluntarily elects to participate in the Cap-and-Trade Program under section 147.113(f) may rescind its request to opt in to the Program by October 1 of the calendar year in which it requests approval to be an opt-in covered entity.

(d) An opt-in covered entity is subject to all reporting, verification, enforcement, registration, and compliance obligations that apply to covered entities. An opt-in covered entity's first reporting and verification year shall be the calendar year immediately preceding the first year in which it voluntarily elects to be subject to a compliance obligation pursuant to this section, unless the entity opts in pursuant to section 147.113(f), in which case the entity must continue to report and verify emissions, product data (if applicable), and all other data required by MRR.

(e) Opting out. At the end of any given compliance period, an opt-in covered entity may choose to opt out of the program provided its annual emission levels for any data year remain below the inclusion thresholds set forth in section 147.112. An entity choosing to opt out of the program must either fulfill its compliance obligations as required pursuant to subchapter 7 or surrender allowances equivalent to all the directly allocated allowances it has received from the budget years for the compliance period in question. An opt-in covered entity that wishes to opt-out of this program must apply to the Department by September 1 of the last year of a compliance period.

(f) An entity that was previously a covered entity, meets the requirements of section 147.111, and drops below the inclusion thresholds set forth in section 147.112 for an entire compliance period, may request approval from the Department to voluntarily opt in to the Cap-and-Trade Program. This request must be submitted by June 1 of the first year of the new compliance period immediately after a compliance period during which the entity's emissions were below the inclusion thresholds. To qualify for opt-in covered entity status under this section (147.113(h)), the entity can only request to be an opt-in covered entity starting in the year the request is submitted.

§ 147.114. Voluntarily Associated Entities and Other Registered Participants.

(a) Voluntarily Associated Entities (VAE). An entity not identified as a covered entity or opt-in covered entity that intends to hold Pennsylvania compliance instruments may apply to the Department pursuant to section 147.130(c) for approval as a voluntarily associated entity.

(1) The following list defines the entities that may qualify as voluntarily associated entities:

(A) An individual, or an entity that does not meet the requirements of sections 147.111 and 147.113, that intends to purchase, hold, sell, or voluntarily retire compliance instruments;

(B) An entity operating an offset project or early action offset project that is registered with DEP pursuant to subchapters 13 or 14. Entities qualifying as voluntarily associated entities under this subparagraph may hold offsets without needing to fulfill the requirements of section

147.130(c)(1)(G). Entities qualifying as voluntarily associated entities under this subparagraph may also hold allowances, but only after fulfilling the requirements of section 147.130(c)(1)(G); or

(C) An entity providing clearing services in which it takes only temporary possession of compliance instruments for the purpose of clearing transactions between two entities registered with the Cap-and-Trade Program. A qualified entity must be a derivatives clearing organization as defined in the Commodities Exchange Act (7 U.S.C § 1a(9)) that is registered with the U.S. Commodity Futures Trading Commission pursuant to the Commodities Exchange Act (7 U.S.C. § 7a-1(a)).

(2) An individual registering as a voluntarily associated entity must have a primary residence in the United States.

(3) Registration and Consulting Activities. An individual who provides cap-and-trade consulting services as described in section 147.223 and also registers as a voluntarily associated entity in the tracking system must disclose to the Department the entities for which the individual is providing consulting services.

(A) The disclosure must be made when the individual registers as a voluntarily associated entity, or within 30 days of initiating the consulting activity if the individual is already registered.

(B) If the individual is associated with an entity providing cap-and-trade consulting services so that in the course of the individual's duties the individual gains access to the market position of another registered entity, then the individual must provide a notarized letter from the entity providing the cap-and-trade consulting services stating that it is aware of the individual's plans to apply as a voluntarily associated entity in the Cap-and-Trade Program and that it has conflict of interest policies and procedures in place which prevent the individual from using information gained from the relationship with the entity for personal gain in the Cap-and-Trade Program. Failure to provide such a letter by the applicable deadline in section 147.114(a)(3)(A) will result in suspension, modification, or revocation of the individual's tracking system account.

(4) An individual who is already registered in the tracking system and intends to provide cap-and-trade program advisory services to other registrant(s) must disclose the

proposed relationship with the other registrant(s) to the Department and comply with the requirements of section 147.114(a)(3)(B) prior to providing the advisory services. Failure to provide such a letter by the deadline will result in suspension, modification, or revocation of the individual's tracking system account.

(5) An entity registering as a voluntarily associated entity must be located in the United States, according to the registration information reported pursuant to section 147.130(c).

(6) Individuals identified by registered entities pursuant to sections 147.130(c)(1)(B), (C), (J), and (L) and section 147.132, unless disclosed pursuant to section 147.114(a)(3), are not eligible to register as voluntarily associated entities.

(7) An individual who is an employee of an entity subject to the requirements of MRR or the Cap-and-Trade Program is not eligible to register as a voluntarily associated entity.

(b) Restrictions on Other Registered Participants. The following entities do not qualify to hold compliance instruments and do not qualify as a Registered Participant:

- (1) An offset verifier accredited pursuant to section 147.278;
- (2) A verification body accredited pursuant to section 147.278;
- (3) Offset Project Registries;
- (4) Early Action Offset Programs approved pursuant to subchapter 14; or
- (5) An MRR verifier.

Subchapter 4: Compliance Instruments

§ 147.120. Compliance Instruments Issued by Department.

(a) Pennsylvania Greenhouse Gas Emissions Allowances.

(1) The Department shall create Pennsylvania GHG allowances pursuant to the schedule set forth in subchapter 6.

(2) The Department shall assign each Pennsylvania GHG allowance a unique serial number that indicates the annual allowance budget from which the allowance originates.

(3) The Department shall place these allowances into a holding account under the control of the Department pursuant to section 147.131(b).

(b) Offset Credits Issued by DEP.

(1) The Department shall issue and register DEP offset credits pursuant to the requirements of subchapters 13 and 14.

(2) Surrender of DEP offset credits shall be subject to the quantitative usage limit set forth in section 147.154.

(c) Each compliance instrument issued by the Secretary represents a limited authorization to emit up to one metric ton in CO₂e of any greenhouse gas specified in section 147.110, subject to all applicable limitations specified in this chapter. No provision of this chapter may be construed to limit the authority of the Secretary to terminate or limit such authorization to emit. Neither the issuance of a compliance instrument by DEP nor the registration of a compliance interest in an account by the account administrator creates any obligation on the part of the Commonwealth of Pennsylvania or the DEP to maintain this Chapter 147 or the Pennsylvania GHG cap-and-trade program in its current form, and the Commonwealth or DEP may amend or repeal this Chapter 147 or the Pennsylvania GHG cap-and-trade program and the rights and privileges that it creates without any obligation to compensate the holder of a compliance instrument for any diminution of value of a compliance instrument that may occur as a result of such amendment or termination.

(d) The MRR contemplates that compliance instruments are tradeable instruments among persons having an obligation to or otherwise becoming entitled to hold compliance

instruments (“Authorized Holders”). As between Authorized Holders, compliance instruments constitute intangible personal property; contracts for transfer or assignment of compliance instruments are enforceable in Pennsylvania courts; and an Authorized Holder can create and perfect a security interest in a compliance instrument in accordance with the Pennsylvania Uniform Commercial Code. Transfer of a compliance instrument on the books of the accounts administrator or an exchange is intended to constitute physical delivery of the compliance instrument, and a contract for such transfer at a later date is intended to operate as a forward contract and not a future contract under the Commodity Exchange Act. Compliance contracts are not securities subject to the Pennsylvania Securities Act of 1972.

§ 147.121. Compliance Instruments Issued by Approved Programs.

The following compliance instruments may be used to meet a compliance obligation under this chapter:

- (a) Allowances specified in section 147.242(b) and issued by a program approved by rule under section 147.240 or approved DEP pursuant to section 147.241;
- (b) Offset credits specified in section 147.242(c) and issued by a program approved by DEP pursuant to section 147.241;
- (c) DEP offset credits issued for purposes of early action pursuant to section 147.290;
- (d) Sector-based offset credits recognized pursuant to subchapter 14; and
- (e) Compliance instruments specified in sections 147.121(c) through (d) are subject to the quantitative usage limit set forth in section 147.154.

Subchapter 5: Registration and Accounts

§ 147.130. Registration with DEP.

(a) General Provisions.

(1) The Secretary or his or her designate shall serve as accounts administrator or may contract with an entity to serve as accounts administrator.

(2) An entity qualified to register with DEP cannot apply for more than one set of accounts in the tracking system, except as otherwise provided in section 147.130(g)(4).

(3) An entity cannot hold a compliance instrument until the Department approves the entity's registration and the accounts administrator creates an account in the tracking system.

(b) Entities Eligible for Registration.

(1) An entity must qualify for registration in the tracking system as a covered entity (pursuant to section 147.111), as an opt-in covered entity (pursuant to section 147.113), or as a voluntarily associated entity (pursuant to section 147.114).

(2) If an entity qualifies for registration pursuant to section 147.111 or 147.113, the facility operator, fuel or CO₂ supplier, electric power entity, or operator of petroleum and natural gas systems, as applicable, must register pursuant to this section and meet all other applicable requirements of this chapter.

(3) Entities Eligible for Initial Registration in a Consolidated Account.

(A) If a group of unregistered entities that each qualifies for registration and are each members of a direct corporate association, then they may choose to register for a consolidated account on behalf of some or all of the group members.

(B) If one entity has control over any of the entities in a group of entities applying for a consolidated account as measured by the indicia of control in section 147.133(a), then the registration process must be initiated and completed by that entity.

(c) Requirements for Registration. Registration is complete when the Department approves the registration and the accounts administrator informs the entity of the approval.

(1) An entity must complete an application to register with DEP for an account in the tracking system. Applicants must provide the following information:

(A) Name, physical and mailing addresses, contact information, entity type, date and place of incorporation, and jurisdiction of formation;

(B) Names and addresses of the entity's directors and officers with authority to make legally binding decisions on behalf of the entity, and partners with over 10 percent of control over the partnership, including any individual or entity acting as the managing member, managing partner or general partner;

(C) Names and contact information for persons controlling over 10 percent of the voting rights attached to all the outstanding voting securities of the entity;

(D) A Government issued taxpayer or Employer Identification Number, or for entities located in the United States, a U.S. Federal Tax Employer Identification Number, if assigned;

(E) Identification of the qualifications for registration pursuant to sections 147.111, 147.113, or 147.114;

(F) Disclosure of all other entities with whom the entity has a direct corporate association or indirect corporate association that must be reported pursuant to section 147.133(d), and a brief description of the nature of the association. Entities qualifying as voluntarily associated entities under section 147.114(a)(1)(B) must complete this disclosure before they may hold allowances;

(G) An applicant that is a member of a direct corporate association may apply for a consolidated entity account to include other associated registered entities from within the direct corporate association. To do so, the applicant must identify each associated registered entity that will be assigned to its account, and each associated registered entity must provide an attestation signed by its officer or director to confirm that it seeks to be added to the consolidated entity account. The applicant must be able to demonstrate that it has the controlling ownership or authority to act on behalf of all members of the direct corporate association. The applicant cannot be an entity that is a subsidiary to or controlled by another associated entity within the direct corporate association;

(H) An applicant that is a member of a direct corporate association and seeks to apply for its own separate entity account, rather than apply for a consolidated entity account, must provide an allocation of the holding and purchase limits among the separate accounts established for any of its corporate associates per the requirements of section 147.133(d)(1)(E). All members of a direct corporate association must separately confirm the allocation of holding and purchase limits;

(I) Names and contact information for all employees of the entity with knowledge of the entity's market position (current and/or expected holdings of compliance instruments and current and/or expected covered emissions);

(J) An entity registering as an opt-in covered entity must identify the first year it intends to be subject to a compliance obligation, and the year must match the year for which the Department approved the entity as an opt-in covered entity pursuant to section 147.113(b); and

(K) Information required pursuant to section 147.223 for individuals serving as Cap-and-Trade Consultants and Advisors for entities participating in the Cap-and-Trade Program.

(2) An entity that is applying for registration in the Pennsylvania Cap-and-Trade Program, and that has a direct corporate association with an entity registered in an external GHG emissions trading system to which the Pennsylvania Cap-and-Trade Program has linked pursuant to section 147.240 or section 147.243 may not include that associated registered entity in a consolidated entity account.

(3) To create a consolidated account for entities that are members of a direct corporate association that accept assignment to a consolidated entity account, the Department shall instruct the accounts administrator to create a single consolidated entity account in the tracking system that includes the following:

(A) A holding account as described in section 147.131;

(B) A compliance account only for a consolidated entity account with at least one member entity that is eligible for a compliance account as described in section 147.131; and

(C) An annual allocation holding account only for a consolidated entity account with at least one member entity that is eligible for an annual allocation holding account as described in section 147.131.

(4) An entity must designate a primary account representative and at least one, and up to four, alternate account representatives pursuant to section 147.132. An individual registering as a voluntarily associated entity may elect to have a combined role to serve as both primary and alternate account representatives or designate additional account representatives or account viewing agents as desired.

(5) An individual registering as a voluntarily associated entity and having a primary residence in the United States, but not located in Pennsylvania, must designate an agent for service of process in Pennsylvania. The agent may be an individual who resides in Pennsylvania, or a corporation or other fictitious entity qualified to do business in Pennsylvania and with an bona fide office in Pennsylvania.

(6) An entity applying for registration that is not an individual or an entity supplying exchange clearing services pursuant to section 147.114(a)(1)(C) must designate, pursuant to section 147.132, either:

(A) A primary account representative or at least one alternate account representative with a primary residence in Pennsylvania; or

(B) An agent for service of process in Pennsylvania. For entities registering into Pennsylvania, the agent may be an individual who resides in Pennsylvania or a corporation or other fictitious entity qualified to do business in Pennsylvania and with an bona fide office in Pennsylvania.

(7) Any individual who requires access to the tracking system, including the primary account representative, alternate account representatives, or account viewing agents must first register as a user in the tracking system.

(A) An individual qualified to register as a user in the tracking system cannot apply for more than one user registration.

(B) An individual cannot be designated in a capacity requiring access to the tracking system until the Department approves the user's registration in the tracking system. This prohibition includes all primary account representatives, alternate account representatives, and account viewing agents.

(C) An individual registering in the tracking system must provide all applicable information required by sections 147.132, 147.133, and 147.134.

(D) An individual registering in the tracking system must agree to the terms and conditions contained in Appendix B of this chapter.

(8) An entity or individual applicant may be denied registration:

(A) Based on the information provided;

(B) If the Department determines the applicant has provided false or misleading information;

(C) If the Department determines the applicant has withheld information material to the registration;

(D) If an individual fails to comply with section 147.134 Know-Your-Customer Requirements;

(E) If an individual is already registered and has a user account under the same or a different name. This provision applies to individuals registered in an approved external linked GHG emissions trading system.

(d) Registration Deadlines.

(1) An entity that meets or exceeds the inclusion thresholds in section 147.112 must complete registration within 30 calendar days of the reporting deadline contained in MRR when it first reports to DEP emissions that exceed the inclusion threshold.

(2) An opt-in covered entity that is approved for opt-in covered status pursuant to section 147.113(b) must complete registration by October 1 of the year before the entity is approved to have a compliance obligation.

(3) An entity qualifying as a voluntarily associated entity pursuant to section 147.114 may register at any time.

(e) Updating Registration Information.

(1) When there is a change to the information registrants have submitted pursuant to section 147.130(c)(1)(A)-(E) and (I), (c)(4), (c)(5), or (c)(6)(B), registrants must update the

registration information within 30 calendar days of the change. When there is a change to the information registrants have submitted pursuant to section 147.130(c)(1)(J), registrants must update the registration information within one year of the change.

(2) Updates of information on corporate associations provided pursuant to section 147.130(c)(1)(G) must be updated on the schedule contained in section 147.133(e). An entity qualifying as a voluntarily associated entity under section 147.114(a)(1)(B) that did not complete the disclosure required by section 147.130(c)(1)(G) at the time of registration may choose to complete that disclosure at any time; such an entity will only be allowed to hold allowances upon approval of the disclosure by the Department.

(3) Updates of information on Cap-and-Trade Consultants or Advisors provided pursuant to section 147.130(c)(1)(L) must be updated per the schedule contained in section 147.223(c).

(4) An entity that fails to update registration information by the applicable deadline may be subject to the restriction or revocation of its tracking system accounts pursuant to section 147.221(g)(3).

(f) Information Confidentiality. The following information collected about individuals during the registration process will be treated as confidential by the Department and the accounts administrator to the extent possible, and except as needed in the course of oversight, investigation, enforcement and prosecution:

(1) Information collected pursuant to section 147.130(c)(1)(B), (C), (J) and (L);

(2) Information collected about individuals pursuant to section 147.134; and

(3) Information collected about individuals pursuant to section 147.132.

(g) Linking.

(1) An entity located in Pennsylvania based on the physical location information the entity must provide pursuant to section 147.130(c)(1)(A) must register with Pennsylvania.

(2) An entity located outside of Pennsylvania, but in the United States based on the physical location information the entity must provide pursuant to section 147.130(c)(1)(A) may

only register with Pennsylvania to participate in the Pennsylvania Cap-and-Trade Program unless that entity:

(A) Does not qualify as a covered or opt-in covered entity in Pennsylvania, and

(B) Qualifies as a covered or opt-in covered entity in an external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12.

(3) An entity not located within Pennsylvania, the United States, or a jurisdiction operating an external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12, may register with a jurisdiction in which it qualifies as a covered or opt-in covered entity.

(4) Entities with a Compliance Obligation in More than One Jurisdiction.

(A) If an entity registered with Pennsylvania has a compliance obligation in an external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12, then that entity may also register directly with that jurisdiction pursuant to that jurisdiction's registration requirements or the entity may request that the accounts administrator provide the entity's Pennsylvania registration application to the jurisdiction operating the linked GHG ETS to facilitate registration in the linked jurisdiction. The entity may still need to submit additional registration attestations or other materials specific to the linked jurisdiction's registration requirements.

(B) If an entity registered with an external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 has a compliance obligation with Pennsylvania, then the entity must register with Pennsylvania and provide the information in paragraphs 1. to 6. below:

1. Name, physical and mailing addresses, contact information, entity type, date and place of incorporation, and jurisdiction of formation;

2. A Government issued taxpayer or Employer Identification Number, or for entities located in the United States, a U.S. Federal Tax Employer Identification Number, if assigned;

3. Identification of the qualifications for registration pursuant to sections 147.111, 147.113, or 147.114.

4. For all registration information required pursuant to sections 147.130 and 147.133 not listed in paragraphs 1. through 3. above, the entity may submit registration information to the

Pennsylvania accounts administrator or may request that the accounts administrator of the external GHG ETS provide the entity's registration information submitted to the external GHG ETS to the Pennsylvania accounts administrator to facilitate registration in Pennsylvania.

5. Regardless of whether the entity registers with Pennsylvania by completing the process contained in sections 147.130 and 147.133 or by requesting the external GHG ETS to submit the registration application materials to the Pennsylvania accounts administrator to facilitate registration in Pennsylvania, the entity must submit all Pennsylvania-specific registration attestations required by this chapter.

6. An individual approved by an external GHG ETS with a user account and who intends to be designated as a primary account representative, alternate account representative, or account viewing agent for an entity registering or registered in Pennsylvania must submit all Pennsylvania-specific registration attestations and other applicable information required by sections 147.132, 147.133, and 147.134.

(5) Pennsylvania will recognize the registration of an entity that registers into an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 and allow that entity to participate in the Pennsylvania Cap-and-Trade Program.

§ 147.131. Account Types.

(a) Accounts Created for Registered Entities.

(1) The Department shall not create more than one holding account, one compliance account, one Annual Allocation Holding Account, or one exchange clearing holding account for each entity registered pursuant to 147.130.

(2) Holding Accounts. When the Department approves a registration for a covered entity, an opt-in covered entity, or a voluntarily associated entity, the accounts administrator will create a holding account for the registrant.

(3) Compliance Accounts. When the Secretary approves a registration for a covered entity or opt-in covered entity, the accounts administrator will create a compliance account for the entity.

(A) A covered entity or opt-in covered entity may transfer compliance instruments to its compliance account at any time.

(B) A compliance instrument transferred into a compliance account may not be removed by the entity.

(C) The Department may transfer compliance instruments into a compliance account. The Secretary may remove compliance instruments to satisfy a compliance obligation, or when closing an account.

(4) Exchange Clearing Holding Accounts. When the Department approves registration for an entity identified as a voluntarily associated entity pursuant to section 147.114(a)(3), then the accounts administrator will create an exchange clearing holding account for the entity.

(A) Entities may transfer compliance instruments to exchange clearing accounts only for the purpose of transferring control of the instruments to the entity performing the clearing function.

(B) The clearing entity may only transfer the compliance instruments in its exchange clearing holding account to the account designated by the entity receiving the allowances under the transaction being cleared.

(5) Annual Allocation Holding Account. After the Department has approved an entity's application for a direct allocation under subchapter 9, the accounts administrator will create an annual allocation holding account for the entity.

(A) The Department will place allowances allocated to an entity on a date prior to the vintage year of the allowances into the entity's annual allocation holding account.

(B) Entities may only transfer allowances from an annual allocation holding account to their compliance account. No other transfer of allowances from an annual allocation holding account is permitted.

(C) Allowances transferred from an annual allocation holding account to an entity's compliance account will be subject to the holding limit pursuant to section 147.220(c).

(D) Allocation of allowances to entities whose application for a direct application has been approved will be transferred to the entity's holding account on January 1 of the vintage year of the allowances, unless otherwise provided in the Department's approval of the entity's application.

(b) Accounts under the Control of the Secretary. The accounts administrator will create and maintain the following accounts under the control of the Department:

(1) A holding account to be known as the Allocation Holding Account into which the serial numbers of compliance instruments will be registered when the compliance instruments are created.

(2) A holding account to be known as the Auction Holding Account into which allowances are transferred to be sold at auction from:

(A) The Allocation Holding Account;

(B) The holding accounts of those entities for which allowances are being auctioned on consignment pursuant to section 147.221(g)(3); and

(C) The compliance accounts of entities fulfilling an untimely surrender obligation pursuant to section 147.157(d)(1)(A).

(3) A holding account to be known as the Retirement Account to which the Secretary will transfer compliance instruments from compliance accounts or from holding accounts under the control of the Secretary for the purpose of permanently retiring them. Alternatively, entities may voluntarily retire compliance instruments by transferring the compliance instruments to the Retirement Account.

(A) When compliance instruments are registered into the Retirement Account, these compliance instruments cannot be returned to any other holding or compliance account.

(B) When compliance instruments are registered into the Retirement Account, any External GHG ETS to which Pennsylvania links pursuant to subchapter 12 will be informed of the retirements.

(C) The Department will record the retired instruments in a publicly available Permanent Retirement Registry.

(4) A holding account to be known as the Allowance Price Containment Reserve Account:

(A) Into which the serial numbers of allowances directly allocated to the Allowance Price Containment Reserve pursuant to section 147.170(a) will be transferred; and

(B) From which the Department will authorize the withdrawal of allowances for sale to covered entities pursuant to section 147.213.

(5) A holding account to be known as the Forest Buffer Account:

(A) Into which the Department will place DEP offset credits pursuant to section 147.283(a); and

(B) From which the Department may retire DEP offset credits pursuant to sections 147.283(b)(2), (c)(3), and (c)(4) and place them into to the Retirement Holding Account.

(6) [reserved]

(7) A holding account to be known as the External GHG Program Holding Account, which will process voluntary retirements under the Retirement-Only Agreements listed in section 147.243(d).

(A) Entities that are part of an external GHG program with a Retirement-Only Agreement with Pennsylvania may contract with registered entities to transfer compliance instruments to the External GHG Program Holding Account for retirement for recognition in their external GHG program. To be eligible for recognition, the transfer request must specify the entity identification code assigned to the entity by the external GHG program in which it is registered.

(B) The Department will review each transfer into the External GHG Program Holding Account for compliance with the requirements of this chapter.

(C) If the transfer conforms to the requirements of this chapter, the Department will transfer the compliance instruments to the Retirement Account.

(D) The Department will transmit a summary of the retirements to the jurisdiction named in the Retirement-Only Agreement based on the timing specified in the Retirement-Only Agreement.

(c) Additional accounts may be created by the Department to implement the Cap-and-Trade Program.

§ 147.132. Designation of Representatives and Agents.

(a) An application for registration into the Pennsylvania Cap-and-Trade Program for an account must designate a single primary account representative and at least one, but no more than four, alternate account representatives. Any communication between the accounts administrator and an alternate account representative must also be addressed to the primary account representative. A complete application for an account, or a request to designate or redesignate account representatives and agents pursuant to section 147.132(f), shall be submitted to the accounts administrator and shall include the following elements:

(1) Name, business and primary residence addresses, email addresses, and phone numbers of the primary account representative and any alternate account representatives and account viewing agents;

(2) Name of the organization designating the primary account representative or any alternate account representative to represent its ownership interest with respect to the compliance instruments held in the account;

(3) The primary account representative and any alternate account representative must attest, pursuant to section 147.103(a), to DEP as follows: “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that I was selected as the primary account representative or the alternate account representative, as applicable, by an agreement that is binding on all persons who have an ownership interest with respect to compliance instruments held in the account. I certify that I have all the necessary authority to carry out the duties and responsibilities contained in 25 Pa. Admin. Code sections 147.100 et seq. on behalf of such persons and that each such person shall be fully bound by my representations, actions, inactions, or submissions and by any order or decision issued to me by the accounts administrator or a court regarding the account.”;

(4) An attestation verifying the selection of the primary account representative, alternate account representatives, and account viewing agents, signed by the director or officer of the entity who is responsible for the conduct of the primary account representative, alternate account representatives, and account viewing agents, and who is one of the directors or officers disclosed pursuant to section 147.130(c)(1)(B);

(5) The signature of the primary account representative and any alternate account representative and the dates signed; and

(6) An attestation as follows: “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. I certify under penalty of perjury of the laws of the Commonwealth of Pennsylvania that the statement of information submitted to the Department of Environmental Protection is true, accurate, and complete.”

(b) Unless otherwise required by the Department, documents of agreement referred to in section 147.132(a) in the application for an account shall not be submitted to the accounts administrator. The accounts administrator shall not be under any obligation to review or evaluate the sufficiency of such documents, if submitted.

(c) Authorization of primary account representative. Upon receipt by the accounts administrator of a complete application for an account under section 147.130(c):

(1) The accounts administrator will establish an account or accounts for the person or persons for whom the application is submitted pursuant to section 147.131.

(2) The primary account representative and any alternate account representative for the account shall represent and, by his or her representations, actions, inactions, or submissions, legally bind each entity that owns compliance instruments held in the account in all matters pertaining to this chapter, notwithstanding any agreement between the primary account representative or any alternate account representative and such entity.

(3) Any such entity shall be bound by any decision or order issued to the primary account representative or any alternate account representative by the Secretary or a court regarding the account. Any representation, action, inaction, or submission by any alternate account representative shall be deemed to be a representation, action, inaction, or submission by the primary account representative or any alternate account representative.

(d) Each submission concerning the account shall be submitted, signed, and attested to, pursuant to section 147.103(a), by the primary account representative or any alternate account representative for the entity that owns the compliance instruments held in the account. Each such

submission shall include the following attestation statement by the primary account representative or any alternate account representative: “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that I am authorized to make this submission on behalf of the entity that owns the compliance instruments held in the account. I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that the statements and information submitted to the Department of Environmental Protection are true, accurate, and complete. I consent to the jurisdiction of Pennsylvania and its courts for purposes of enforcement of the laws, rules and regulations pertaining to Pa. Code Chapter 147, and the Pennsylvania Air Pollution Control Act and I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.”

(e) The accounts administrator will accept or act on a submission concerning the account only if the submission has been made, signed, and attested to in accordance with this section.

(f) Changing primary account representative and alternate account representative.

(1) The primary account representative for an account may be changed at any time upon receipt by the accounts administrator of a designation of a primary account representative for an account under section 147.130(c). Notwithstanding any such change, all representations, actions, inactions, and submissions by the previous primary account representative, or the previous alternate account representative prior to the time and date when the accounts administrator approves the designation of a primary account representative shall be binding on the new primary account representative and the entity that owns the compliance instruments in the account. Except as provided in section 147.132(f)(3), the change of a primary account representative must include completion of an attestation by the individual, submission of an attestation from an active primary or alternate account representative, and an attestation from a director or officer as described in section 147.132(a)(3)-(a)(6).

(2) The alternate account representative for an account may be changed at any time upon the approval by the accounts administrator of a designation of an alternate account representative for an account under section 147.130(c). Notwithstanding any such change, all representations, actions, inactions, and submissions by the previous primary account representative, or the previous alternate account representative, prior to the time and date when the accounts administrator approves the designation of an alternate account representative shall be binding on the new alternate account representative and the entity that owns the compliance instruments in the account. Except as provided in section 147.132(f)(3), the change of an alternate account representative must include completion of an attestation by the individual, submission of an attestation from an active primary or alternate account representative, and an attestation from a director or officer as described in section 147.132(a)(3)-(a)(6).

(3) The primary account representative for an account may be designated as an alternate account representative and an alternate account representative for an account may be designated as the primary account representative at any time upon approval by the accounts administrator of a designation of a primary account representative or alternate account representative for an account under section 147.130(c).

(A) Any prior attestation signed by an active account representative and any signature of a director or officer of the entity responsible for the conduct of the primary account representative and alternate account representative will remain applicable even if account representative roles are swapped.

(B) A new attestation by the primary account representative or an alternate account representative that previously submitted a signed attestation is not required.

(C) A new attestation by a director or officer of the entity responsible for the conduct of the primary account representative and alternate account representatives is not required if the director or officer is disclosed pursuant to section 147.130(c). Otherwise, if the director or officer has not been disclosed pursuant to section 147.130(c), then a new attestation as described in section 147.132(a)(4) verifying the selection of the primary account representative and alternate account representative must be submitted to the accounts administrator.

(4) If a registered entity no longer has at least one primary or alternate account representative, a director or officer disclosed pursuant to section 147.130(c)(1)(B) must identify

new representatives and agents with an attestation from the director or officer as described in section 147.132(a)(3)-(4). The Secretary maintains the ability to suspend or revoke the registration until two account representatives are designated on the entity's tracking system accounts.

(g) Objections Concerning Account Representatives.

(1) Once a complete application for an account under section 147.130(c) has been submitted and received, the accounts administrator will rely on the application unless and until a superseding complete application for an account under section 147.130(c) is received by the accounts administrator.

(2) Except as provided in section 147.132(f)(1), no objection or other communication submitted to the accounts administrator concerning the authorization, or any representation, action, inaction, or submission of the primary account representative or any alternate account representative for an account shall affect any representation, action, inaction, or submission of the primary account representative or any alternate account representative or the finality of any decision or order by the accounts administrator under this chapter.

(3) The accounts administrator will not adjudicate any private legal dispute concerning the authorization or any representation, action, inaction, or submission of the primary account representative or any alternate account representative for an account, including private legal disputes concerning the proceeds of compliance instrument transfers.

(h) Delegation by primary account representative and alternate account representatives.

(1) A primary account representative or an alternate account representative for a registered entity may authorize up to five natural persons per account that may view all information contained in the tracking system involving the entity's accounts, information, and transfer records (account viewing authority). The persons delegated shall not have authority to take any other action with respect to an account on the tracking system.

(2) In order to delegate account viewing authority in accordance with section 147.132(h)(1) the primary account representative or alternate account representative, as

appropriate, must submit to the accounts administrator a notice of delegation, that includes the following elements:

(A) The name, address, email address, and telephone number of such primary account representative or alternate account representative;

(B) The name, address, email address, and telephone number of each such natural person, herein referred to as “account viewing agent;” and

(C) An attestation verifying the selection of the account viewing agent, signed by the officer of the entity who is responsible for the conduct of the account viewing agent, and is one of the officers disclosed pursuant to section 147.130(c)(1)(B).

(3) A notice of delegation submitted under section 147.132(h)(2) shall be effective, with regard to the accounts identified in such notice, upon receipt of such notice by the accounts administrator and until receipt by the accounts administrator of a superseding notice of delegation by such primary account representative or alternate account representative as appropriate. The superseding notice of delegation may replace any previously identified account viewing agent, add a new account viewing agent, or eliminate entirely any delegation of authority.

§ 147.133. Disclosure of Corporate Associations.

(a) Criteria for Determining Corporate Associations.

(1) A corporate association exists when one entity has an ownership interest in or control over a second entity. The following indicia of control determine ownership or control:

(A) Percent of ownership of any class of authorized and issued shares, the right to acquire authorized shares, or any option to purchase such shares of the other entity;

(B) Percent of common owners, directors, or officers of the other entity;

(C) Percent of the voting power of the second entity;

(D) In the case of a partnership other than a limited partnership, percent of the interests of the partnership;

(E) In the case of a limited partnership, the percent of control over the general partner or the percent of the voting rights to select the general partner; and

(F) In the case of a limited liability corporation, percent of ownership in the other entity regardless of how the interest is held.

(2) An entity has a direct corporate association with another entity, regardless of whether the second entity is registered in the Cap-and-Trade Program or in an external GHG ETS to which Pennsylvania is linked pursuant to subchapter 12, if either one of these entities has any indicia of control described in section 147.133(a)(1) that is greater than 50 percent.

(3) A direct corporate association also exists when two entities are connected through a line of more than one direct corporate association.

(A) An entity (x) has a direct corporate association with another entity (y) if the two entities share a common parent and that parent has a direct corporate association with each entity (x and y) when applying the indicia of control contained in section 147.133(a)(2).

(B) An entity that has a direct corporate association with a second entity also has a direct corporate association with any entity with whom the second entity has a direct corporate association.

(4) An entity has an indirect corporate association with another entity if:

(A) The two entities do not have a direct corporate association; and

(B) The controlling entity's percentage of ownership or any indicia of control identified in section 147.133(a)(1) of the controlled entity is more than 20 percent but less than or equal to 50 percent. If the two entities are connected through a chain of more than one corporate association, the indicia of control identified in section 147.133(a)(1) is calculated by multiplying the percentages at each link in the chain of corporate associations starting with the last entity that is in a direct corporate association. An indirect corporate association exists between the two entities if the total percentage of control is more than 20 percent but less than or equal to 50 percent when multiplying the percentage of control at each link in the chain of corporate associations.

(5) The owner or operator of an electricity generating facility in Pennsylvania has a direct corporate association with the operator of another electricity generating facility in Pennsylvania if the same entity either owns or operates both generating facilities.

(6) Direct Corporate Associations and Individuals Who Have Shared Roles. An individual who has access to the market positions (current and/or expected holdings of compliance instruments and current and/or expected covered emissions) of two or more entities registered in the tracking system or registered in an external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 is considered an individual who has shared roles. For the purposes of this requirement, Account Representatives are defined as having access to the market positions of the entities that they serve.

(A) If any individual with shared roles is an employee of a registered entity for which the individual has a shared role, the entities for which the individual has the shared role will have a direct corporate association.

(B) If any individual is a Cap-and-Trade Consultant or Advisor for the entities for which the individual has a shared role, but is not disclosed pursuant to section 147.223, and the individual can use market position information obtained through the shared role without restriction, the entities for which the individual has shared roles will have a direct corporate association. It is the responsibility of the registered entity employing an individual as a Cap-and-Trade Consultant or Advisor pursuant to section 147.223 to determine if the individual has access to the entity's market position.

(b) Disclosure of Corporate Associations.

(1) Disclosure of Associated Registered Entities. Entities must disclose all direct and indirect corporate associations with entities registered in the Pennsylvania Cap-and-Trade Program or in another external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12.

(2) Disclosure of Unregistered Parent Entities. Entities must disclose all direct corporate associations with entities not registered in the Pennsylvania Cap-and-Trade Program or in another external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 if those entities have the degree of ownership interest in or control over the registered entity to meet the requirements of having a direct corporate association.

(3) Disclosure of Unregistered Entities in a Line of Corporate Associations Between Registered Entities. A registered entity that has a direct or indirect corporate association with

another registered entity must disclose the identity of all entities involved in the line of direct or indirect corporate associations between the two registered entities, even if such entities are not registered.

(4) Disclosures of Direct Corporate Associations with Unregistered Entities in the United States or Canada. Entities that have direct corporate associations with unregistered entities in the United States or Canada that are otherwise not required to be disclosed must disclose those associations within 30 calendar days of a request by the Department. The disclosing entity may elect to disclose only those directly associated entities located in the United States or Canada that participate in a market related to the Cap-and-Trade Program.

(A) Entities participating in a market related to the Cap-and-Trade Program include only those that purchase and sell greenhouse gas emissions instruments, natural gas, oil, or electricity; or conduct trades involving derivatives or swaps based on greenhouse gas emission instruments, natural gas, oil, or electricity.

(B) The disclosure of entities in related markets may be accomplished through the submission of the most recent information submitted to another government agency in the United States using one or more of the following official governmental forms or documentation as needed to meet the required disclosure: (1) Exhibit 21 of the Form 10-K submitted to the Securities and Exchange Commission by the registrant or an affiliate of the registrant; (2) the application for market-based rate authority, or update to such application, submitted by the registrant or an affiliate of the registrant to the Federal Energy Regulatory Commission pursuant to 18 CFR Part 35 and Order 697; (3) the application for registration with the National Futures Association, or update to such application, submitted by the registrant or an affiliate of the registrant as required by the Commodity Futures Trading Commission pursuant to the Commodity Exchange Act; (4) Form 40 or Form 40S filed by the registrant or an affiliate of the registrant in accordance with the Commodity Futures Trading Commission's reporting rules; and/or (5) Part 1A of a Form ADV filed with the Securities and Exchange Commission by a registered investment advisor responsible for managing the registrant.

(5) Disclosures of Other Unregistered Entities Outside the United States and Canada. Entities that have direct corporate associations with other entities outside the United States and Canada that participate in a market related to the Cap-and-Trade Program that are not otherwise

required to be disclosed must disclose those associations within 30 calendar days of a request by the Secretary.

(A) Entities participating in a market related to the Cap-and-Trade Program include only those that purchase and sell greenhouse gas emission instruments, natural gas, electricity, or oil; or conduct exchange trades involving derivatives or swaps based on greenhouse gas emission instruments, natural gas, oil, or electricity.

(B) Entities may disclose these associations using the documentation options listed in section 147.133(b)(4)(B).

(c) Disclosure Exemptions.

(1) Any registered entity subject to affiliate compliance rules promulgated by state or federal agencies shall not be required to disclose information or take other action that violates those rules.

(2) An entity registering as a voluntarily associated entity pursuant to section 147.114(a)(1)(B) solely to hold offsets is not required to disclose any direct or indirect corporate associations.

(d) Disclosure Requirements.

(1) Entities disclosing direct or indirect corporate association must provide the following information to identify each reportable corporate association:

(A) Name, contact information, and physical address of the entity;

(B) Tracking system entity identification number, if applicable;

(C) A government issued Taxpayer Identification Number or Employer Identification Number, or for entities located in the United States, a U.S. Federal Tax Employer Identification Number, if assigned; and

(D) Date of and jurisdiction of formation, if applicable;

(E) For direct corporate associations with registered entities only, the percentage share of the holding limit and purchase limit assigned to each entity opting out of account consolidation pursuant to section 147.130(c)(1)(I); the sum of the shares must equal 100 percent.

(2) Entities that have disclosable corporate associations must identify whether the type of corporate association is direct or indirect.

(A) Entities identifying an indirect corporate association must provide a brief description of the association, including information sufficient to explain the entity's evaluation of the indicia of control in section 147.133(a)(1) that was used to determine the type of corporate association disclosed for each associated entity.

(B) Entities identifying a direct corporate association must identify the nature of the associated entity as a parent, a subsidiary, or an entity with a common parent, but need not include an evaluation of the indicia of control.

(3) Methods of Disclosure. All corporate association disclosures required by this section must be provided in a manner described in section 147.103(a).

(e) Disclosure Timing. The entity must disclose the information pursuant to section 147.133(d):

(1) At the time of registration pursuant to section 147.130;

(2) Within 30 calendar days of the creation of a direct or indirect corporate association or of a change in the type of a corporate association involving registered entities pursuant to sections 147.133(b)(1) or 147.133(a)(6)(B), or registered and unregistered entities pursuant to section 147.133(b)(2) and (3);

(3) Within one year of a modification if the changes in information involve only unregistered entities disclosed pursuant to sections 147.133(b)(4) and (5);

(4) No later than 10 calendar days prior to the auction application deadline established in section 147.212 when disclosing a change related to another entity registered in the Pennsylvania Cap-and-Trade Program or another external GHG ETS to which Pennsylvania has linked pursuant to subchapter 12, if the disclosing entity intends to participate in the auction; and

(5) Within one year for all other changes.

§ 147.134. Know-Your Customer Requirements.

(a) General Requirements.

(1) The accounts administrator cannot provide access to the tracking system to an individual until the Department has determined the individual applying for participation has complied with the requirements of this section.

(2) The requirements of this section are in addition to any requirements contained elsewhere in this chapter that apply to the functions the individual will undertake in the tracking system.

(3) All documents submitted to the Department pursuant to this section shall be in English.

(4) Individuals with a criminal conviction in any jurisdiction in the five previous years constituting a felony under U.S. federal law or Pennsylvania law, or the equivalent thereof, are ineligible for registration and participation in the Cap-and-Trade Program.

(b) The individual must provide documentation of the following:

(1) Name;

(2) The address of the primary residence of the applicant, which may be shown by any of the following:

(A) A valid government-issued identity card or government-issued document with an expiration date;

(B) Any other document that is customarily accepted by the Commonwealth of Pennsylvania as evidence of the primary residence of the individual;

(3) Date of birth;

(4) Proof of an open bank account in the United States, except as provided in section 147.134(b)(4)(B) below;

(A) The proof must be in the form of a bank statement dated no earlier than 3 months prior to submission, must identify the individual holding the account, and must contain the name and business address of the bank.

(B) If an applicant will only represent a covered entity located outside of the United States, the applicant may either provide:

1. Proof of an open bank account in the United States, or
2. Documentation of an open bank account in the country in which the covered entity is located. This documentation must be accompanied by a signed attestation of an officer or director of the applicant's employer to DEP as follows: "I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that the person requesting access to the market tracking system will be designated as an account representative for this entity. This entity is a covered entity under the Pennsylvania Cap-and-Trade Regulation and has no personnel residing in the United States with the authority to take actions that are binding on all persons who have an ownership interest with respect to compliance instruments held in the account for this entity."

(5) Employment or other relationship to an entity that has registered or has applied to register with the Pennsylvania Cap-and-Trade Program if the individual is or will represent an entity registering or registered pursuant to section 147.130;

(6) A government-issued document providing photographic evidence of identity of the applicant which may include:

(A) A valid government-issued identity card or driver's license with an expiration date and date of birth; or

(B) A passport; and

(7) Any criminal conviction declared in any jurisdiction during the previous five years constituting a felony under U.S. federal law or Pennsylvania law, or the equivalent thereof. This disclosure must include the type of violation, jurisdiction, and year.

(c) An individual who will become an account representative or viewing agent of a covered entity or opt-in covered entity as defined in section 147.002 may choose to provide documentation pursuant to section 147.134(b) directly to their employer instead of to DEP. An entity's director or officer disclosed pursuant to section 147.130(c)(1)(B) must confirm that the individual meets the Know-Your-Customer Requirements described in section 147.134 and that the entity will retain the documentation.

(1) The covered entity or opt-in covered entity must verify the identity of the individual and confirm that the individual does not have a criminal conviction constituting the

equivalent of a felony under U.S. federal law or Pennsylvania law, or the equivalent thereof, in any jurisdiction during the previous five years.

(2) A director or officer disclosed pursuant to section 147.130(c)(1)(B) of the covered entity must complete an attestation to verify the accuracy and veracity of the documentation submitted pursuant to section 147.134(b).

(3) The documents submitted by the individual shall be retained by the entity, and the Secretary or his/her designated representative shall be permitted, at any time, to review and audit the documentation. The covered or opt-in covered entity must provide this documentation to the Secretary or his/her designated representative within 5 calendar days of a request by the Secretary.

(d) Verification of information.

(1) One of the documents submitted pursuant to section 147.134 must be notarized by a notary public no more than three months before submittal.

(2) The notary stamp or seal, the notary public's name, the county or state of the notary public's place of business, and the commission expiration date must be legible.

(3) If a notary is obtained from outside of the United States, an apostille must be submitted to confirm that the individual who notarized the document had valid commission at the time that the document was notarized. The apostille must be attached to the notarized document.

(4) The Secretary may request re-verification of all documents required pursuant to Section 147.134 at least every two years. To allow verification, upon request and within ten days, the individual must provide updated documentation required pursuant to 147.134(b).

§ 147.135. Changes to Entity Type and Reassignment of Facilities Already Registered to Different Entity Accounts.

(a) Assignment of Facilities to Entity Accounts.

(1) Subdivision of MRR Facilities with Distinct DEP IDs Currently Registered in the Tracking System. The following provisions apply to facilities that are currently registered in the tracking system and wish to change their entity type or account assignment(s):

(A) A facility may not be subdivided without a demonstration of a change to the continuity of its ownership and control to one or more of its constituent units.

(B) The subdivided units must complete all the requirements of MRR before they can be reassigned from existing tracking system accounts, including the assignment of a DEP ID to each subdivided unit.

(C) The subdivided units must complete the disclosure process outlined in section 147.135(b).

(D) The entity seeking the subdivision must either indicate the existing accounts to which the subdivided facilities will be assigned or complete an application for a new account, or for closure of an existing account, if applicable.

(2) Assignment of a New Facility to an Account. The owner or operator of a new facility that has received a DEP ID but that is not yet assigned to a tracking system account must register pursuant to section 147.130 and request either a new account or assignment of the facility to an existing account.

(3) Changing Account Assignments within a Direct Corporate Association. Members of a direct corporate association may request a change to the distribution of facilities within their set of accounts only once per compliance period. Approved changes to consolidate or opt-out of account consolidation pursuant to section 147.130(b)(3) will be effective at the beginning of the next compliance period provided that the request is made by June 30 of the year immediately preceding that next compliance period.

(b) Change of Facility Ownership. When the ownership of a facility changes, the following information must be submitted to DEP within 30 calendar days of finalization of the ownership change:

(1) A description of the merger or acquisition and the effective date of the change of ownership, including whether the merger or acquisition is the purchase of a facility or facilities from another entity or the purchase of an entity that owns a facility or facilities;

(2) Both the legal and operating names and the tracking system entity IDs of the entities owning the facility or facilities prior to the change of ownership;

(3) The legal name, operating name, and the tracking system entity ID of the purchasing entity, if any;

(4) Written direction regarding whether the purchased facility or facilities will be added to a consolidated entity account or whether the purchased facility or facilities will be associated with an entity that will opt-out of account consolidation pursuant to section 147.130(b)(3);

(5) Documentation with signatures (original or electronic pursuant to section 147.103(a)) by an authorized person from the entity the facility or facilities and from the purchasing entity, notifying DEP of the change of ownership;

(6) Any changes to disclosures or new disclosures pursuant to section 147.133;

(7) Direction regarding the disposition of compliance instruments that must be transferred by the jurisdiction to the purchasing entity. Compliance instruments can be transferred only between accounts of the same type (e.g., from a compliance account to a compliance account) and any administrative transfers required may be requested as a one-time occurrence scheduled to occur within five business days after the facility or facilities are transferred in the tracking system to the purchasing entity;

(8) It is the responsibility of the entities participating in the change of ownership to transfer any compliance instruments from tracking system holding accounts that they control prior to closing the transaction effecting change of ownership. Prior to closing, the Secretary may transfer compliance instruments from an entity's compliance account to its holding account upon request by the entity. If a covered entity no longer owns or operates any active facility in its tracking account due to a change of facility ownership, then that covered entity may exit the Program and close its tracking system accounts within five business days after the facility or facilities are transferred in the tracking system to the purchasing entity.

(c) Eligibility for a Change of Entity Type.

(1) Eligibility of an Opt-In Covered Entity to Change Its Entity Type.

(A) After a compliance period, an opt-in covered entity may choose to exit the Program or apply for a new tracking system account to change its entity type to a voluntarily associated entity provided that it meets the requirements specified in section 147.113(g).

(B) An opt-in covered entity choosing to exit the Program must fulfill its compliance obligations as required pursuant to subchapter 7 and report and verify emissions data, product data, and any other data required pursuant to MRR for its final year with a compliance obligation to allow for any true-up allocations pursuant to subchapters 8 and 9 before requesting a change of entity type.

(2) Eligibility of a Covered Entity or Opt-In Covered Entity to Change Its Entity Type.

(A) Effect of Reduced Emissions on a Covered Entity's Compliance Obligation. A covered entity that reports annual covered GHG emissions less than 25,000 metric tons of CO₂e per year during one entire compliance period may request a change to its entity type from the Department by the deadlines specified in section 147.135(e)(1). If the covered entity does not complete the change in entity type by the deadline and if the covered entity is not an opt-in covered entity, then the Department will consider the entity as a voluntarily associated entity for the assignment of purchase limit and holding limit, if applicable. If the entity does not apply to change its entity type by the deadline, then the Department maintains the ability to suspend or revoke the registration and any compliance instruments remaining in the entity's tracking system accounts will be consigned on the entity's behalf or transferred pursuant to section 147.135(f) or 147.190(k).

(B) Effect of a Facility Shutdown on a Covered Entity's Compliance Obligation. Once a covered or opt-in covered entity has fully met the reporting cessation requirements of the MRR due to ceasing to operate, full facility shutdown, and cessation of all activities subject to reporting under the MRR, DEP will begin the account closure process pursuant to section 147.135(f). Fuel suppliers and electric power entities may not claim eligibility for a change of entity type under this provision, and may only request to close their accounts if no further activity is expected.

(C) A fuel supplier or electric power entity that is eligible for a change in entity type that will result in its no longer being a covered entity and has fully met the reporting and verification requirements of the MRR may exit the Cap-and-Trade Program pursuant to section 147.135(f).

(3) A voluntarily associated entity is eligible to request to exit the Cap-and-Trade Program at any time.

(4) The Department may close the account of a voluntarily associated entity if no compliance instruments are transferred into or out of the account for a period of two years.

(d) Options for Changing Entity Type. When an entity qualifies for a change in entity type pursuant to section 147.135(c), the following shall apply:

(1) A covered entity may elect to remain in the Cap-and-Trade Program as an opt-in covered entity pursuant to section 147.113(h) and does not need to apply for a new set of tracking system accounts; or

(2) A covered entity or an opt-in covered entity may elect to remain in the Cap-and-Trade Program and apply for a new tracking system account as a voluntarily associated entity pursuant to section 147.114; or

(3) An entity that has fully met the reporting cessation requirements of the MRR may elect to exit the Cap-and-Trade Program pursuant to section 147.135(f).

(e) If a covered entity or opt-in covered entity qualifies for a change in entity type, it may request a change by completing the following requirements:

(1) Request Deadlines.

(A) A covered entity requesting a change in entity type pursuant to section 147.135(c)(2)(A) must make the request to the Secretary by September 30 of the first calendar year after the end of a compliance period.

(B) A covered entity or opt-in covered entity requesting a change in entity type pursuant to section 147.135(c)(2)(B) has 30 days from the completion of the MRR cessation of reporting provisions, or within 30 calendar days of the finalization of the ownership change, whichever is sooner, to request to remain in the Program and apply as a voluntarily associated entity.

(C) A covered entity whose request to be an opt-in covered entity pursuant to section 147.113(h) was approved by the Department must request a change in entity type by September 30 of the same year as the deadline specified in section 147.113(h).

(D) An opt-in covered entity that intends to exit the program entirely must make a request to the Department by September 30 of the first calendar year immediately after the end of a compliance period.

(2) A covered entity or opt-in covered entity that qualifies for account closure pursuant to section 147.135(c)(2)(B) must, after fulfilling its compliance obligation for its final year of operations pursuant to section 147.156 and addressing final allocation provisions pursuant to section 147.135(f), elect one of the following options:

(A) Request to close its tracking system accounts, comply with MRR cessation of reporting provisions pursuant to section 95101(h) or (i), and apply to be in the tracking system as a voluntarily associated entity as defined in section 147.114; or

(B) Request to consolidate its holding and compliance accounts with an existing account held by another entity pursuant to section 147.130(b)(3) with whom it has a direct corporate association and comply with MRR cessation of reporting provisions pursuant to section 95101(h) or (i); or

(C) Request to close its tracking system accounts within 30 calendar days after the entity is qualified to request an account closure, comply with MRR cessation of reporting provisions per section 95101(h), and exit the Program.

(f) Account Closure for Entities Exiting the Program.

(1) Return of Initial Allocation for Entities Exiting the Program. An entity may not exit the Program pursuant to section 147.135 until the entity has satisfied the requirements in 147.190(k). If an entity has met the cessation requirements and remains in the Program solely to meet the requirements of section 147.190(k), then the entity need not report and verify data pursuant to MRR for any time period after which the MRR cessation requirements have been met.

(2) When an entity requests that the Department close its accounts in the tracking system, it must arrange to transfer all compliance instruments out of its accounts before the accounts can be closed. If the entity has compliance instruments in its compliance or holding account when a request for account closure is submitted, then the entity may request a one-time administrative transfer for DEP to either:

(A) Transfer the compliance instruments from its compliance account to the entity's holding account to allow the entity to transfer the allowances out of its account; or

(B) Transfer the compliance instruments from its compliance and holding accounts to the account of another registered entity or to the Retirement Account at the request of the entity closing the account.

(3) When the entity's accounts are clear of compliance instruments then the accounts will be closed.

Subchapter 6: Pennsylvania Greenhouse Gas Allowance Budgets

§ 147.140. Compliance Periods.

Duration of Compliance Periods is as follows:

(a) The first compliance period starts on January 1, _____ [of the year following the publication of this regulation in the Pennsylvania] and ends on either December 31, 2020, or December 31, 2023, if the compliance period starts after January 1, 2020.

(b) Each subsequent compliance period shall commence on the first day of January following the end of the last compliance period and last for three years.

§ 147.141. Annual Allowance Budgets.

(a) The Pennsylvania GHG Allowance Budget for the year 2018 shall be equal 0.97 times the 2016 GHG emissions from all sources and other entities required to surrender allowances under this regulation as determined by the Department (“E₂₀₁₆”) and shall decrease by 0.03 E₂₀₁₆ in each subsequent year.

(b) The Pennsylvania GHG Allowance Budget for the first year that this regulation becomes effective shall be as determined under section 147.141(a) notwithstanding the fact that the regulation may become effective for a calendar year after 2018.

(c) The Department shall publish notice of the budget for the first year in which compliance will be required under this chapter within sixty (60) days of receiving the Initial Baseline Report. Any auction that occurs before the budget is determined shall be based on the Department’s initial estimate of the budget published in the Pennsylvania Bulletin with notice of the final rule adopting this chapter.

§ 147.141 Impact of Delay or Stay of Effective Date

(a) The annual allowance budgets set forth in this subchapter are indented to result in the emissions reductions that the Intergovernmental Panel on Climate Change has determined are necessary to prevent to most severe adverse impacts of climate disruptions resulting from anthropogenic emissions of greenhouse gases. Failing to achieve the emissions reductions

contemplated by the allowance (and emissions budgets) for 2040 and 2050 will cause severe and irreparable adverse impacts on health and the resources with respect to which the Commonwealth has a duty as a trustee under Article I, § 27 of the Constitution.

(b) No delay in the effective date of this chapter, whether caused by the duration of the rulemaking process or judicial or legislative action, shall affect the scheduled reductions in the allowance budgets set forth in this subchapter. Thus, the emissions reductions contemplated by this subchapter for 2030 shall be required notwithstanding any delay in the first effective date of this regulation.

(c) If this regulation takes effect after January 1, 2020, the Department shall reduce the emissions budgets for the years remaining through December 31, 2030 by the amount that emissions between January 1, 2020 and January 1 of the year in which this chapter takes effect exceed the allowance budgets for that period.

Subchapter 7: Compliance Requirements for Covered Entities

§ 147.150. General Requirements.

(a) Reporting Requirements. Each covered entity identified in section 147.111 is subject to MRR.

(b) An entity's compliance obligation is equal to the total of the metric tons of CO₂e emissions subject to a compliance obligation for which a positive or qualified positive emissions data verification statement is issued, rounded to the nearest whole ton, or for which there are assigned emissions pursuant to MRR.

(c) Record Retention Requirements. Each entity must retain all of the following records for at least 10 consecutive years and must provide such records within 20 calendar days of receiving a written request from DEP, including:

- (1) Copies of all data and reports submitted under this chapter;
- (2) Records used to calculate a compliance obligation as specified in section 147.153;
- (3) Emissions data and product data verification statements the MRR; and
- (4) Detailed verification reports as required pursuant to the MRR.

§ 147.151. [reserved]

§ 147.152. Emission Categories Used to Calculate Compliance Obligations.

(a) Operators of Facilities.

(1) An operator of a facility covered under sections 147.111(a) and 147.112(c)(1) has a compliance obligation for every metric ton of CO₂e for which a positive or qualified positive emissions data verification statement is issued in accordance with the MRR, including process emissions, stationary combustion emissions and vented emissions. If DEP has assigned emissions for the sources subject to a compliance obligation pursuant to this section, the facility will have a compliance obligation equal to the value of every metric ton of CO₂e assigned emissions. The entity's compliance obligation will be assessed at the facility level unless otherwise noted under section 147.112(c).

(2) Combustion emissions resulting from burning RBOB, distillate fuel oils, or liquefied petroleum gas which are required to surrender allowances under this regulation are not included when calculating an operator's compliance obligation.

(b) First Deliverers of Electricity. A first deliverer of electricity covered under sections 147.111(b) and 147.112(c)(2) has a compliance obligation for every metric ton of CO₂e emissions calculated pursuant to section 147.152(b)(1) for which a positive or qualified positive emissions data verification statement is issued pursuant to MRR, or for which there are assigned emissions, when such emissions are from a source in Pennsylvania or in a jurisdiction where a GHG emissions trading system has not been approved for linkage or linked by rule pursuant to subchapter 12.

(1) Calculation of emissions for compliance obligation.

(A) For first deliverers that are operators of an electricity generating facility in Pennsylvania, the calculation for compliance obligation includes all emissions reported and verified or assigned pursuant to MRR, except emissions without a compliance obligation pursuant to section 147.152.2.

(B) For first deliverers that are electricity importers, emissions with a compliance obligation are calculated using the following equation:

$$\text{CO}_2\text{e}_{\text{covered}} = \text{CO}_2\text{e}_{\text{unspecified}} + \text{CO}_2\text{e}_{\text{specified}} - \text{CO}_2\text{e}_{\text{linked}}$$

Where:

$\text{CO}_2\text{e}_{\text{covered}}$ = Annual metric tons of CO₂e with a compliance obligation.

$\text{CO}_2\text{e}_{\text{unspecified}}$ = Annual metric tons of CO₂e from unspecified imported electricity.

$\text{CO}_2\text{e}_{\text{specified}}$ = Annual metric tons of CO₂e from imported electricity from specified sources that meet the requirements of MRR section 95111(b)(2).

$\text{CO}_2\text{e}_{\text{linked}}$ = Annual metric tons of CO₂e from electricity with a first point of receipt located in a jurisdiction where a GHG emissions trading system has been approved for linkage or linked by rule pursuant to subchapter 12.

(C) All deliveries of electricity not meeting the requirements for specified sources pursuant to MRR will have emissions calculated using the default emission factor for unspecified electricity where $CO_2e_{unspecified} = MWh * TL * EF_{unsp}$

Where:

CO_2e = Annual CO_2 equivalent mass emissions from the unspecified electricity deliveries at each point of receipt identified (MT of CO_2e).

MWh= Megawatt hours of unspecified electricity deliveries at each point of receipt identified.

$EF_{unsp} = 0.48$ MT of CO_2e/MWh , the default emission factor for unspecified electricity imports

$TL = 1.02$, a transmission loss correction factor to account for transmission losses.

(2) Resource shuffling is prohibited and is a violation of this chapter.

(3) The following criteria must be met for electricity importers to claim a compliance obligation for delivered electricity based on a specified source emission factor or asset controlling supplier emission factor.

(A) Electricity deliveries must be reported to DEP and emissions must be calculated.

(B) The electricity importer must be the facility operator or have right of ownership or a written power contract to the amount of electricity claimed and generated by the facility or unit claimed; and

(C) The electricity must be directly delivered to the Pennsylvania grid.

(4) If PJM imposes a carbon adder on electricity generated in jurisdictions other than those having ETS programs linked to the Pennsylvania cap-and-trade program and the adder is equivalent to the estimated price of allowances that the generator would have been required to surrender in Pennsylvania if the electricity generation sources were located in Pennsylvania, imported electricity shall be exempt from the requirement to surrender allowances under this chapter.

(c) Suppliers of Natural Gas. A supplier of natural gas covered under sections 147.111(c) and 147.112(d) has a compliance obligation for every metric ton CO₂e of GHG emissions that would result from full combustion or oxidation of all fuel delivered to end users in Pennsylvania contained in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned, less the fuel that is delivered to covered entities, as follows:

(1) Suppliers of natural gas shall report the total metric tons CO₂e of GHG emissions delivered to all end users in Pennsylvania pursuant to the MRR;

(2) DEP shall calculate the metric tons CO₂e of GHG emissions for natural gas delivered to covered entities which are customers of the supplier. The emissions will be calculated using the reconciled reported deliveries (in MMBtu) contained in natural gas supplier emissions data reports that received a positive or qualified positive emissions data verification statement. Natural gas received data (in MMBtu) contained in covered facility emissions data reports that received positive or qualified positive emissions data verification statements will be used to reconcile delivery data reported by natural gas suppliers, and will serve as a second source of data in instances of missing supplier data. In the event that a natural gas supplier receives an adverse verification statement, DEP will calculate the supplier's assigned emission level;

(3) DEP shall provide the supplier of natural gas a listing of all customers and aggregate natural gas (in MMBtu) and emissions calculated from the supplier's natural gas delivered to covered entities; and

(4) DEP shall calculate the metric tons CO₂e for which the supplier will be required to hold a compliance obligation based on the supplier's reported emissions less DEP's calculated emissions from deliveries to covered entities that are customers of the supplier. The Department shall provide this value to the supplier of natural gas within 30 days of the verification deadline in the MRR.

(d) Suppliers of RBOB and Distillate Fuel Oils. A supplier of petroleum products covered under sections 147.111(d) or 147.112(d) has a compliance obligation for every metric ton CO₂e of GHG emissions included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been

assigned that would result from full combustion or oxidation of the quantities of the following fuels that are removed from the rack in Pennsylvania, sold to entities not licensed in Pennsylvania as a fuel supplier, or imported into Pennsylvania and not directly delivered to the bulk-transfer/terminal system, except for products for which a final destination outside Pennsylvania can be demonstrated:

- (1) RBOB;
- (2) Distillate Fuel Oil No. 1; and
- (3) Distillate Fuel Oil No. 2.
- (e) Suppliers of Liquefied Petroleum Gas:

- (1) A producer of liquefied petroleum gas covered under sections 147.111(e) and 147.112(d) has a compliance obligation for every metric ton CO₂e of GHG emissions included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned that would result from full combustion or oxidation of all fuel sold, distributed, or otherwise transferred for consumption in Pennsylvania; and

- (2) An importer of liquefied petroleum gas covered under section 147.111(e) has a compliance obligation for every metric ton CO₂e of GHG emissions included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned that would result from full combustion or oxidation of all fuel imported into Pennsylvania.

- (f) Suppliers of Blended Fuels. An entity that supplies any of the fuels covered under sections 147.111(f) and 147.112(d) as blended fuels has an aggregated compliance obligation for every metric ton of CO₂e of GHG emissions based on the separate constituents of the blend included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned that would result from full combustion or oxidation of the fuel.

- (g) Carbon Dioxide Suppliers. An entity that supplies carbon dioxide, “Carbon Dioxide Supplier” or “CO₂ Supplier”, covered under sections 147.111(h) and 147.112(c)(3), has an aggregated compliance obligation based on the sum of MT CO₂ included in an emissions data

report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned minus exported CO₂ that is not geologically sequestered, and minus CO₂ verified to be geologically sequestered through use of a Department-approved carbon capture and sequestration quantification methodology that ensures that the emissions reductions are real, permanent, quantifiable, verifiable, and enforceable. Emissions of CO₂ already covered with a compliance obligation upstream are not included.

(h) Petroleum and Natural Gas Systems. Operators of petroleum and natural gas production facilities, natural gas processing plants, natural gas transmissions compression facilities, underground natural gas storage facilities, and liquefied natural gas storage, import and export facilities, and natural gas distribution facilities (collectively “Petroleum and Natural Gas Systems”) have a compliance obligation for every metric ton of CO₂e from CO₂, CH₄, and N₂O emissions from all sources including the following source types:

- (1) Metered natural gas pneumatic device and pump venting;
- (2) Non-metered natural gas pneumatic device venting;
- (3) Acid gas removal vents;
- (4) Dehydrator vents;
- (5) Well venting for liquids unloading;
- (6) Gas well venting during well completions and workovers;
- (7) Equipment and pipeline blowdowns;
- (8) Dump valves;
- (9) Well testing venting and flaring;
- (10) Associated gas venting and flaring;
- (11) Flare stack or other destruction device emissions;
- (12) Centrifugal compressor venting;
- (13) Reciprocating compressor venting;
- (14) EOR injection pump blowdown;
- (15) Crude oil, condensate and produced water CO₂ and CH₄;

(16) Equipment leaks from valves, connectors, open ended lines, pressure relief valves, pumps, flanges, and other equipment leak sources (such as instruments, loading arms, stuffing boxes, compressor seals, dump lever arms, and breather caps);

(17) Equipment leaks at below grade transmission-distribution transfer stations;

(18) Equipment leaks at above grade metering-regulating stations that are not above grade transmission-distribution transfer stations;

(19) Equipment leaks at below grade metering-regulating stations.

(20) Distribution main equipment leaks;

(21) Distribution services equipment leaks;

(22) Stationary fuel combustion sources;

(23) CO₂ and CH₄ emissions from customer meters (N₂O emissions excluded);

and

(24) CO₂ and CH₄ emissions from pipeline dig-ins (N₂O emissions excluded).

(i) The compliance obligation for sources specified in sections 147.152(a) through (h), and 147.152.1 is calculated based on the sum of the following, as applicable:

(1) Emissions of CO₂, CH₄, and N₂O which resulted from combustion of fossil fuel;

(2) Emissions of CH₄ and N₂O which resulted from combustion of all biomass-derived fuel;

(3) Emissions of CO₂ which resulted from combustion of biomass-derived fuels that do not meet the requirements in section 147.152.2(a);

(4) Emissions of CO₂ which resulted from combustion of biomass-derived fuels pursuant to section 147.152.1; and

(5) All process and vented emissions of CO₂, CH₄, and N₂O except for those listed in section 147.152.2(b).

(j) Suppliers of Liquefied Natural Gas and Compressed Natural Gas. A supplier of liquefied natural gas and/or compressed natural gas covered under sections 147.111(g) or

147.112(d) has a compliance obligation for every metric ton CO_{2e} of GHG emissions included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned that would result from full combustion or oxidation of the quantities of liquefied natural gas or compressed natural gas imported into Pennsylvania and/or produced in Pennsylvania from gas received from an interstate pipeline, excluding products for which a final destination outside Pennsylvania can be demonstrated, less the emissions from liquefied natural gas delivered to other covered entities as determined by DEP based on end-user delivery information reported by the supplier.

(k) Supplier of Coal. A supplier of coal covered under this chapter has a compliance obligation for every metric ton CO_{2e} of GHG emissions included in an emissions data report that has received a positive or qualified positive emissions data verification statement or for which emissions have been assigned that would result from full combustion or oxidation of the quantities of coal imported into Pennsylvania and/or produced in Pennsylvania, excluding products for which a final destination outside Pennsylvania can be demonstrated, less the emissions from coal to other covered entities as determined by DEP based on end-user delivery information reported by the supplier.

§ 147.152.1. Compliance Obligations for Biomass-Derived Fuels.

An entity that has emissions from combustion of biomass-derived fuels is required to report and verify its emissions and has a compliance obligation for every metric ton of CO_{2e} emissions:

- (a) From combustion of fuel types that are not listed under section 147.152.2; or
- (b) From combustion of fuels sourced from outside Pennsylvania that do not meet the requirements of section 147.152.1.1; or
- (c) That are reported as non-exempt biomass derived CO₂ under MRR.

§ 147.152.1.1. Eligibility Requirements for Biomass-Derived Fuels.

An entity may not sell, trade, give away, claim, or otherwise dispose of any of the carbon credits, carbon benefits, carbon emissions reductions, carbon offsets or allowances, howsoever entitled, attributed to the fuel production that would, when combined with the CO₂ emissions from complete combustion of the fuel, result in more CO_{2e} emissions than would have occurred

in the absence of the fuel production. In the case of biomethane or biogas produced from digesters or landfills, the resulting credit for avoided methane emissions may not exceed the global warming potential plus 2.75 in metric tons of CO₂e per ton of captured methane. All calculations of CO₂e emissions are based on the 100-year global warming potentials included in MRR. Generation of Renewable Energy Credits is excluded from this analysis and will not prevent a biomass-derived fuel that meets the requirements in this section from being exempt from a compliance obligation.

§ 147.152.2. Emissions without a Compliance Obligation.

Emissions from the following source categories and from the combustion of the following fuel types count toward applicable reporting thresholds, but do not count toward a covered entity's compliance obligation set forth in this chapter unless those emissions are reported as non-exempt biomass-derived CO₂ under MRR. Emissions without a compliance obligation include:

- (a) CO₂ emissions from combustion of the following biomass-derived fuels:
 - (1) The biogenic fraction of solid waste materials as reported under MRR;
 - (2) Waste pallets, crates, dunnage, manufacturing and construction wood wastes, tree trimmings, mill residues, and range land maintenance residues;
 - (3) All agricultural crops or waste;
 - (4) Wood and wood wastes identified to follow all of the following practices:
 - (A) Harvested pursuant to an approved timber management plan prepared in accordance with a locally or nationally approved plan, or a plan consistent with the FSF or SFI certification program; and
 - (B) Harvested for the purpose of forest fire fuel reduction or forest stand improvement.
 - (5) Biodiesel:
 - (A) Agri-biodiesel derived solely from virgin oils, including esters derived from virgin vegetable oils from corn, soybeans, sunflower seeds,

cottonseeds, canola, cramble, rapeseeds, safflowers, flaxseeds, rice bran, mustard seeds, and camelina, and from animal fats.

(B) Biodiesel is defined as monoalkyl esters of long chain fatty acids derived from the following plant or animal matter that meets the requirements of the American Society of Testing Materials (ASTM) D6751:

1. Waste oils;
2. Tallow; or
3. Virgin oils.

(6) Fuel ethanol (including denaturant):

(A) Cellulosic biofuel produced from lignocellulosic or hemicellulosic material that has a proof of at least 150 without regard to denaturants;

- (B) Corn starch; or
- (C) Sugar cane.

(7) The biogenic fraction of municipal solid waste as reported under MRR, including MSW directly combusted or converted to a cleaner-burning fuel;

(8) Biomethane and biogas from the following sources:

- (A) All animal, plant and other organic waste; or
- (B) Landfills and wastewater treatment plants;

(9) Renewable diesel.

(b) The following additional process, vented, and fugitive emissions:

(1) Vented and fugitive emissions from storage tanks used in petroleum and natural gas production and natural gas transmission;

(2) Vented and fugitive emissions reported the MRR by local distribution companies that report the MRR;

(3) Vented and fugitive emissions from natural gas transmission storage tanks used in petroleum and natural gas production and natural gas transmission, and from produced water;

(4) Emissions reported by petroleum refineries from asphalt blowing operations, equipment leaks, storage tanks, and loading operations;

(5) Emissions from intermittent-bleed pneumatic devices;

(6) Vented emissions from well-site centrifugal and reciprocating compressors with a rated horsepower less than 250hp;

(7) Sources for which fugitive emissions are estimated using leak detection and leaker emission factors and sources for which vented and fugitive emissions are estimated using a population count and emissions factors;

(8) Carbon dioxide that is exported for purposes other than geologic sequestration or enhanced oil recovery;

(9) Carbon dioxide used in the carbonation process during sugar production in facilities with NAICS code 311313;

(10) Carbon dioxide from fermentation that occurs during the production of food and beverages; and

(11) For fuel cells powered by biomass-derived fuels as defined in section 147.152.1.1, process emissions from the oxidation of the biomass-derived fuel are exempt from a compliance obligation.

(c) The exemptions provided under this section do not apply where the biomass or carbon dioxide originates from carbon dioxide emissions from fossil fuels or carbonate rock that has been captured and used where no allowances have been surrendered for the original emissions.

§ 147.153. Calculation of Covered Entity's Full Compliance Period Compliance Obligation.

(a) A covered entity that exceeds the threshold in section 147.112 in any of the four data years preceding the start of a compliance period is a covered entity for the entire compliance

period. The covered entity's full compliance period compliance obligation in this situation is calculated as the total of the emissions with a compliance obligation that received a positive or qualified positive emissions data verification statement, or were assigned emissions to correct omissions or errors in their emissions data from all data years of the compliance period.

(b) A covered entity that initially exceeds the threshold in section 147.112 in the first year of a compliance period is a covered entity for the entire compliance period. The covered entity's full compliance period compliance obligation in this situation is calculated as the total of the emissions that received a positive or qualified positive emissions data verification statement, or were assigned emissions to correct omissions or errors in their emissions data from all data years of the compliance period.

(c) A covered entity that initially exceeds the threshold in section 147.112 in the second year of a compliance period is a covered entity for the second and any remaining years of this compliance period. The covered entity's full compliance period compliance obligation in this situation is calculated as the total of the emissions that received a positive or qualified positive emissions data verification statement or were assigned emissions to correct omissions or errors in their emissions data for the second and any remaining data years of the compliance period.

(d) A covered entity that initially exceeds the threshold in section 147.112 in the final year of a later compliance period has a compliance obligation for its emissions that received a positive or qualified positive emissions data verification statement or were assigned emissions to correct omissions or errors in their emissions data for that year, but the entity's full compliance period compliance obligation for the current compliance period is not due the following year. Instead the entity's reported and verified or assigned emissions for this year will be added to the entity's full compliance period obligation for the subsequent compliance period.

§ 147.154. Quantitative Usage Limit on Designated Compliance Instruments— Including Offset Credits.

(a) Compliance instruments identified in section 147.120(b) and sections 147.121(b), (c), and (d) are subject to a quantitative usage limit when used to meet a compliance obligation.

(b) The total number of compliance instruments identified in section 147.154(a) that each covered entity may surrender to fulfill the entity's compliance obligation for a compliance period must conform to the following limit:

Oo/S must be less than or equal to Lo

In which:

Oo = Total number of compliance instruments identified in section 147.154(a) submitted to fulfill the entity's compliance obligation for the compliance period.

S = Covered entity's compliance obligation.

Lo = Quantitative usage limit on compliance instruments identified in section 147.154(a), set at 0.08.

§ 147.155. Annual Compliance Obligation.

(a) An entity has an annual compliance obligation for any year when the entity is a covered entity except for the condition specified in section 147.153(d); and

(b) The annual compliance obligation for a covered entity equals 30 percent of emissions with a compliance obligation reported from the previous data year that received a positive or qualified positive emissions data verification statement or were assigned emissions to correct omissions or errors in their emissions data.

§ 147.156. Timely Surrender of Compliance Instruments by a Covered Entity.

(a) A covered entity must surrender one compliance instrument for each metric ton of CO₂e of GHG emissions for the annual and full compliance period compliance obligations calculated pursuant to this subchapter beginning with the emissions reported in the emissions data report for the first year in which this chapter becomes effective and each subsequent year in which the covered entity has a compliance obligation.

(b) Compliance Instruments Valid for Surrender.

(1) A compliance instrument listed in subchapter 4 may be used to satisfy a compliance obligation.

(2) To fulfill a compliance obligation, a compliance instrument issued pursuant to sections 147.120(a) and 147.121(a) must be issued from an allowance budget year within or before the year for which an annual compliance obligation is calculated or the last year of a compliance period for which a full compliance period compliance obligation is calculated, unless:

(A) The allowance was purchased from a Pennsylvania Allowance Price Containment Reserve sale, is any other Pennsylvania-issued non-vintage compliance instrument, or is an Allowance Price Containment Reserve Allowance or other non-vintage allowance issued by a program approved by DEP pursuant to section 147.241 as specified in section 147.121(a);

(B) The allowance is used to satisfy an excess emissions obligation; or

(C) The allowance is eligible for compliance use pursuant to sections 147.156(h)(1)(D) and 147.156(h)(2)(D).

(c) A covered entity must transfer from its holding account to its compliance account a sufficient number of valid compliance instruments to meet the compliance obligation set forth in sections 147.153 and 147.155.

(d) **Deadline for Surrender of Annual Compliance Obligations.** For any year in which a covered entity has an annual compliance obligation pursuant to section 147.155, it must fulfill that obligation: by November 1, 5 p.m. Eastern Standard Time of the calendar year following the year for which the obligation is calculated. Transfers to compliance accounts may be restricted during the time the tracking system is processing the surrender of the annual compliance obligation.

(e) **Determination of Full Compliance Period Compliance Obligation.**

(1) When a positive or qualified positive emissions data verification statement or assigned emissions for any year is received by DEP, then those emissions for the source categories in section 147.152 equal the full compliance period compliance obligation pursuant to section 147.153.

(2) If a positive or qualified positive emissions data verification statement for any year of the compliance period is not received by DEP by the applicable verification deadline,

DEP will assign emissions based upon past reports or reasonable engineering judgment regarding the party's emissions. The assigned emissions value then equals the compliance obligation.

(f) Surrender of Full Compliance Period Compliance Obligation.

(1) The covered entity must transfer sufficient valid compliance instruments to its compliance account to fulfill its full compliance period compliance obligation by November 1, 5 p.m. Eastern Standard Time of the calendar year following the final year of the compliance period. Transfers to compliance accounts may be restricted during the time the tracking system is processing the surrender of the full compliance period compliance obligation.

(2) The total number of compliance instruments submitted to fulfill the full compliance period compliance obligation is subject to the quantitative use limit pursuant to section 147.154.

(3) The surrender of compliance instruments must equal the full compliance period compliance obligation calculated pursuant to section 147.153 less compliance instruments surrendered to fulfill the annual compliance obligation for the years in the compliance period.

(g) In determining whether the covered entity has fulfilled its compliance obligations, the Department shall:

(1) In the case of annual and full compliance period compliance obligations, determine the status of compliance with the annual or full compliance period compliance obligation by evaluating the number and types of compliance instruments in the Compliance Account; and

(A) Retire the compliance instruments surrendered; and

(B) Inform programs to which Pennsylvania is linked or recognizes, pursuant to subchapters 12 and 14, of the retirements, including the serial numbers of the compliance instruments retired.

(h) Annual and Full Compliance Period Compliance Instrument Requirements.

(1) When a covered entity or opt-in covered entity surrenders compliance instruments to meet its annual compliance obligation pursuant to section 147.156(d), the Secretary will retire them from the Compliance Account in the following order:

(A) Offset credits specified in section 147.120(b) and sections 147.121(b) through (d), up to eight percent of the emissions with a compliance obligation pursuant to section 147.154;

(B) Allowances purchased from a Pennsylvania Allowance Price Containment Reserve sale followed by Allowance Price Containment Reserve Allowances and then other non-vintage allowances issued by a program approved by DEP pursuant to section 147.241 as specified in section 147.121(a);

(C) Allowances specified in section 147.120(a) and 147.121(a) with earlier vintage allowances retired first; and

(D) The current calendar year's vintage allowances and allowances allocated just before the annual surrender deadline up to the true-up allowance amount as determined in sections 147.191(b), 147.191(c)(2)(B), or 147.194(c) if an entity was eligible to receive true up allowances pursuant to section 147.191(b), 147.191(c)(2)(B), or 147.194(c).

(2) When a covered entity or opt-in covered entity surrenders compliance instruments to meet its full compliance period compliance obligation pursuant to section 147.156(f), the Secretary will retire them from the Compliance Account in the following order:

(A) Offset credits specified in section 147.120(b) and sections 147.121(c) and (d) with oldest credits retired first and subject to the quantitative usage limit set forth in section 147.154:

(B) Allowances purchased from a Pennsylvania Allowance Price Containment Reserve sale followed by Allowance Price Containment Reserve Allowances and then other non-vintage allowances issued by a program approved by DEP pursuant to section 147.241 as specified in section 147.121(a);

(C) Allowances specified in section 147.120(a) and 147.121(a) with earlier vintage allowances retired first; and

(D) The current calendar year's vintage allowances and allowances allocated just before the full compliance period surrender deadline up to the true-up allowance amount as determined in section 147.191(b), 147.191(c)(2)(B), or 147.194(c) if an entity was eligible to receive true up allowances pursuant to section 147.191(b), 147.191(c)(2)(B), or 147.194(c).

(3) An entity that is not eligible to receive true up allowances pursuant to section 147.191(b), 147.191(c)(2)(B), or 147.194(c) cannot use the current calendar year's vintage

allowances or allowances allocated just before the current surrender deadline to meet the timely surrender of compliance instrument requirements in section 147.156.

(4) An electric distribution utility will not be in violation of section 147.192(d)(5) when the Secretary retires compliance instruments, if the electric distribution utility has a sufficient quantity of eligible compliance instruments not allocated pursuant to section 147.170(d) in its compliance account, at the time the timely surrender of compliance instruments by a covered entity is due pursuant to section 147.156, that is at least equal to its compliance obligation for any transactions for which the use of allocated allowance value is prohibited under section 147.192(d)(5).

§ 147.157. Untimely Surrender of Compliance Instruments by a Covered Entity.

(a) Applicability.

(1) A covered entity or opt-in covered entity that does not meet the compliance deadline for surrendering its annual or full compliance period compliance obligation pursuant to section 147.156 is subject to the compliance obligation for untimely surrender as described in this section; and

(2) The compliance obligation for untimely surrender (“excess emissions”) will not apply to a covered entity or opt-in covered entity which is determined to have transferred insufficient instruments to meet the compliance obligations of section 147.156 solely because of the invalidation of a DEP offset credit by the Secretary pursuant to section 147.285 until six months after notice of invalidation.

(b) Calculation of the Untimely Surrender Obligation. The untimely surrender obligation is the number of compliance instruments that an entity must surrender if it does not meet its original annual or full compliance period compliance obligation. The untimely surrender obligation replaces any unfulfilled portion of an entity’s annual or full compliance period compliance obligation.

(1) The quantity of excess emissions is the difference between the compliance obligation calculated pursuant to this section and any compliance instruments timely surrendered by the entity;

(2) The entity's compliance obligation for untimely surrender is calculated as four times the entity's excess emissions;

(3) At least three-fourths of an entity's compliance obligation for untimely surrender may only be fulfilled with PA GHG allowances or allowances issued by a GHG ETS pursuant to subchapter 12;

(4) Up to one-fourth of an entity's compliance obligation for untimely surrender may be fulfilled with DEP offset credits or compliance instruments listed in sections 147.121(b), (c), and (d);

(5) The sum of the offset credits submitted by the entity in a timely manner to fulfill its full compliance period compliance obligation plus any offset credits submitted as part of the untimely surrender obligation must be less than or equal to the number of offsets that the entity is allowed to submit when the quantitative usage limit on offset credits is applied to the entity's full compliance period obligation; and

(6) The untimely surrender obligation is due within five days of settlement of the first auction or reserve sale conducted by DEP following the applicable surrender date, whichever is the latter, and for which the registration deadline has not passed when the untimely surrender obligation is assessed. Future vintage allowances are eligible for complying with the untimely surrender obligation.

(c) If an entity with an untimely surrender obligation fails to satisfy this obligation pursuant to section 147.157(b)(6) then:

(1) DEP will determine the number of violations pursuant to section 147.314;

(2) If a portion of the untimely surrender obligation is not surrendered as required, the entity will have a new untimely surrender obligation equal to the amount of the previous untimely surrender obligation which was not satisfied by the deadline stated in section 147.157(b)(6) upon which the number of violations will be calculated pursuant to section 147.314. The new untimely surrender obligation is due immediately; and

(3) There will be no additional untimely surrender obligation amount assessed beyond the new untimely surrender obligation determined pursuant to section 147.157(c)(2).

(d) When the covered entity or opt-in covered entity meets its untimely surrender obligations pursuant to sections 147.157(a) through (c), DEP shall:

(1) Transfer the compliance instruments used to fulfill the untimely surrender obligation in the following manner:

(A) At least three fourths of the compliance instruments to the Auction Holding Account. The three fourths of the compliance instruments transferred to the Auction Holding Account shall only be comprised of allowances; and

(B) The remaining one fourth of compliance instruments to the Retirement Account.

(2) Inform programs to which Pennsylvania is linked or recognizes, pursuant to subchapters 12 and 14, of the retirements, including the serial numbers of the compliance instruments retired.

§ 147.158. Compliance Obligation for Under-Reporting in a Previous Compliance Period.

If, after an entity has surrendered its compliance instruments to fulfill a compliance obligation pursuant to sections 147.156 or 147.157, the Department determines, through an audit or other information, that the entity under-reported its emissions for any emissions sources that form the basis for the entity's compliance obligation, then the following shall apply:

(a) If the difference between the emissions used to calculate the compliance obligation and subsequently used to calculate the number of compliance instruments surrendered pursuant to sections 147.155 or 147.156 and the emissions determined by the Department to be under-reported for the sum of those emissions is less than five percent of the emissions number used to calculate the compliance obligation and subsequently used to calculate the number of compliance instruments surrendered pursuant to sections 147.155 or 147.156, then the entity is not required to take any further action.

(b) If the difference between the emissions used to calculate the compliance obligation and subsequently calculate the number of compliance instruments surrendered pursuant to sections 147.155 or 147.156 and the emissions determined by the Department to be under-reported for the sum of those emissions is more than five percent of the emissions number used to calculate the compliance obligation and subsequently used to calculate the number of

compliance instruments surrendered pursuant to sections 147.155 or 147.156, then the entity must surrender compliance instruments in the following amount:

$$\text{Cla} = \text{EMd} - \text{CO} - (\text{CO} * 0.05)$$

Where:

“Cla” is the number of additional compliance instruments that must be surrendered to DEP to cover under-reported emissions;

“CO” is the emissions number used to determine the compliance obligation surrendered pursuant to sections 147.155 or 147.156; and

“EMd” is the number of the emissions determined by the Secretary for the sum of the emissions sources subject to a compliance obligation.

(c) The entity must surrender additional compliance instruments as determined pursuant to this section for under-reporting emissions under MRR at the next compliance event scheduled pursuant to section 147.156. The provisions of sections 147.157 and 147.314 shall not apply until after the date of that compliance event. The entity may use any compliance instruments acceptable for that compliance event to meet these requirements.

(d) Any determination that an entity under-reported its emissions shall be made by the Secretary no later than eight years from the applicable verification deadline for the emissions data report which contained the under-reporting of emissions.

Subchapter 8: Disposition of Allowances

§ 147.170. Disposition of Allowances.

(a) Allowance Price Containment Reserve. Upon creation of the Allowance Price Containment Reserve Account, the Department shall transfer four percent of each year's annual allowances to the Allowance Price Containment Reserve.

(b) Advance Auction. The Department may create an Advance Auction, in which case it shall create an Auction Holding Account, the Secretary and transfer 10 percent of the allowances from first five predicted budget years to the Auction Holding Account.

(1) These allowances will be eligible to be sold pursuant to section 147.213(f)(5).

(2) All Advance Auction allowances not sold pursuant to section 147.213(f)(5) will be auctioned pursuant to section 147.210.

(3) The proceeds from the sale of these allowances will be deposited in the General Fund unless otherwise directed by the General Assembly and except as provided in section 147.170(b)(3).

(4) If any municipality with an air pollution control program including this cap-and-trade program that has been approved by the Department pursuant to Chapter 133 wishes to have the Department conduct an auction of the allowances governed by the municipality's approved air pollution control program, the Department shall distribute the proceeds from the sale of allowances to the municipality or as otherwise directed by the municipality.

(b) Allocation to Account for Distribution to Parties Approved for a Direct Allocation.

(1) Upon the Department's approval of a party's application for direct allocation of allowances, the Department shall transfer the next year's allocation of allowances for that party to the Approved Direct Allocation Account for that year.

(2) The Department shall transfer any allowances for which a party is entitled to a direct allocation from the Direct Allocation Account to the Party's account upon application by the party after transfer of the allowances into the Direct Allocation Account and upon payment

by the party of any price required by the terms of the Department's approval of the party's application. If any payment is required by the terms of the Department

(3) Allowances in the annual allocation holding account are transferred to the Holding Account on January 1 of the vintage year of the allowances.

(c) All allowances not transferred to the Cost Containment Reserve Allocation to Account for Distribution to Approved Parties shall be made available for auction.

(d) Auction Proceeds and Receipts from the Sale of Directly Allocated Allowances

(1) All proceeds from the sale of allowances shall be transferred to the General Fund, unless another disposition is approved by the General Assembly, or to a municipality with an approved program.

(2) If the General Assembly provides authorization for the transfer of proceeds from allowance sales to any party or fund other than the General Fund, those proceeds shall be transferred as authorized and the transfer of funds to the General Fund pursuant to § 147.170(d)(1) reduced accordingly.

Subchapter 9: Direct Allocations of Pennsylvania GHG Allowances

§ 147.190. Eligibility Requirements for Direct Allocations.

(a) In order to receive a direct allocation of Pennsylvania GHG allowances, an entity must (i) be required to submit allowances under this chapter, (ii) satisfy the eligibility requirements set forth in this section, (iii) have submitted a timely and complete application pursuant to section 147.190, (iv) have been approved or conditionally approved by the Department, and (v) not have changed circumstances by reducing production from the levels one year prior to the effective date of this regulation or closed or partially closed production.

(b) To receive a direct allocation from the Department, the party must demonstrate to the Department that (i) it is involved in the production of goods through industrial or agricultural processes, as determined by the Department; (ii) it is subject to competition from businesses in other states or nations that do not impose a price on CO_{2e} emissions, and (iii) unless the party receives a direct allocation, that competition could reasonably be anticipated to result in “Leakage” as defined herein.

(c) “Leakage” means increased emission of CO_{2e} that occurs as a result of a business activity subject to regulation under this chapter partially or wholly moving to jurisdictions subject to less stringent regulation of those emissions than occurs in Pennsylvania after reducing or ceasing those activities in Pennsylvania.

(d) The following activities shall be ineligible for a direct allocation of allowances:

(1) Generation of electricity for delivery to the grid other than where the process is engaged in the Cogeneration. Processes engaged in Cogeneration otherwise meeting the criteria for a direct allocation of allowances shall be entitled to a direct allocation only to the extent of the CO_{2e} emissions that would have occurred if no electricity generation had occurred, as determined by the Department. In determined the extent of eligibility for Cogeneration, the Department may rely upon the formulae developed by the State of California.

(2) Production, transportation, or distribution of any fossil fuel.

§ 147.191. Applications for Direct Allocation of Allowances.

(a) Applications for direct allocations of allowances shall be submitted to the Department’s central office in Harrisburg, Pennsylvania, at least six (6)

months before the first year in which the applicant wishes the direct allocation to take place.

(b) Each application shall contain, at a minimum, the following information:

(1) Identification of the activity or activities (e.g. process or processes) requiring the surrender of allowances.

(2) A demonstration, for each such activity (or process) that the applicant is subject to competition in jurisdictions that do not regulate the emissions of CO₂e in a manner that will impose a cost equivalent to that imposed by this chapter and that this can reasonably be anticipated to result in Leakage unless the applicant is granted a direct allocation of allowances.

(3) The most recent five (5) years of production data that is available for the activity (or process) for which the direct allocation is sought (or fewer if the activity commenced less than five years previously).

(4) The emissions of CO₂e that would require the surrender of allowances associated with each of those years of production.

(5) The applicant's agreement to supplement and update the information provided annually, even where not required to report.

(6) Such other information as the Department shall deem necessary or appropriate.

§ 147.192. Applications for Direct Allocation of Pennsylvania GHG Allowances for Activities Commencing or Increasing After the Effective Date of this Chapter.

(a) Entities wishing to commence or expand an activity that will require the surrender of allowances under this chapter must satisfy any pertinent eligibility requirements of section 147.191 and submit an application to the Department containing any of the information set forth in section 147.192, to the extent available. The application must contain projected production and projected emissions data and

must demonstrate that the proposed process employs the best available system of control technology for the prevention or reduction of greenhouse gas emissions.

§ 147.194. Department Action on Applications for Direct Allocation of Pennsylvania GHG Allowances.

(a) Upon receipt of an application for direct allocation of Pennsylvania GHG Allowances, the Department shall publish notice of the application in the Pennsylvania Bulletin and provide a twenty-day comment period.

(b) The Department will consult with the Department of Community and Economic Development in connection with any application under this section and consider these comments and any public comments before acting on any such application.

(c) If the Department has not acted on any application submitted at least 180 days before the date for the surrender of allowances, it shall make the direct allocation requested without a charge, subject to the requirement that the applicant surrender any excess allowances and pay all charges pursuant to section 147.196 following the Department's action on any application.

(d) The Department's final action under this section is appealable to the Pennsylvania Environmental Hearing Board.

§ 147.195. Conditions to and Limitations Upon the Direct Allocation of Pennsylvania GHA Allowances.

(a) No direct allocation of allowances may continue after [Insert date], the 20th anniversary of the effective date of this chapter.

(b) Every direct allocation shall be reduced by five percent (5%) of the original allocation per annum.

(c) The Department shall impose the maximum price per ton on the direct allocation, up to the greater of the reserve auction price or the average clearing price of the last two auction, to the extent feasible consistent with the prevention of Leakage. The Department shall reassess

the price each year and adjust it consistent with the objectives of preventing leakage and obtaining a reasonable income for the beneficiaries of the Article I, §27 trust.

(d) Except as provide in subsection (e), DEP shall not approve a direct allocation that is greater than that to which a “Best Sector Performer” would be entitled. The Best Sector Performer is the facility in Pennsylvania in the applicable category or subcategory set forth in 40 C.F.R. part 60 (standards of performance for new stationary sources established under section 111 of the Clean Air Act) that has achieved the lowest rate of GHG emissions per unit of production. The maximum allocation, other than an allocation under subsection (e) of this section would be calculated as follows:

$$A_n = BSR_R * P_n$$

Where A_n is the maximum direct allocation to which a given party “n” is entitled; $A_n = BSR_R$ is the rate of GHG emissions per unit of production in CO₂e that has been achieved by the Best Sector Performer and P_n is the annual production of the given party “n”.

(e) If DEP determines that a direct allocation based on subsection (d) would result in Leakage with respect to any facility (underperforming facility or “UPF”) it may provide for an additional direct allocation. If DEP provides any party with an additional direct allocation, then it shall provide all other Pennsylvania facilities in the same category or subcategory in 40 C.F.R. part 60 with an additional direct allocation according to the following formula:

$$A_n = (A_{UPF}/P_{UPF}) * P_n$$

Where A_n is the allocation to which other facilities in the category or subcategory are entitled; A_{UPF} is the direct allocation that is provided to the underperforming facility; P_{UPF} is the production upon which the underperforming facility’s direct allocation is based P_n is the production rate for the facility “n” receiving the increased allocation.

§147.196. Return of Allocation.

(a) If a covered entity or opt-in covered entity received a direct allocation of allowances for a year in which it ceased production or reduced production by more than five percent in the activity upon which its direct obligation is based, the entity must fulfill the following requirements. The entity must either (i) return N allowances by November 1 of the calendar year $t + 1$, where t is the year for which the entity received an allowance allocation but

reduced or ceased production or (ii) pay the difference between the price that it paid and the clearing price for allowances in the year in which the entity received a direct allocation.

(b) The entity's obligation to return or pay for allowances shall be based on the following formula:

$$N = n - p_1/p_0$$

Where n = the number of direct allowances awarded for the year in which production ceased or was reduced by more than five percent of the production in the year in which production was reduced or ceased and p_0 is the level of production on which the direct allocation is based.

(c) To return allowances to the Department, an entity must place the appropriate number of allowances into its compliance account and notify the Department. The allowances are considered to be returned only after they have been removed from the compliance account by the Department. To pay for allowances, the entity must make payment in the same manner as if it had purchased the allowances at auction. If an entity fails to return allowances or make additional payment, then DEP will determine the number of violations pursuant to section 147.314.

Subchapter 10: Auction and Sale of Pennsylvania Greenhouse Gas Allowances

§ 147.210 Auction of Pennsylvania GHG Allowances.

(a) **Timing of the Allowance Auctions.** Auctions shall be conducted on the schedule pursuant to Appendix C. The schedule may be adjusted by a maximum of 4 business days from the dates listed in Appendix C.

(b) **General Requirements.** An allowance may be designated for auction prior to or after its vintage year.

(c) Allowances from future vintages will be auctioned separately from allowances from current and previous vintages each quarter.

(1) **Auction of Allowances from the Current and Previous Budget Years.**

(A) This auction will be known as the Current Auction.

(B) One quarter of the allowances allocated for auction from the current calendar year's budget will be designated for sale at each Current Auction.

(C) The Current Auction may include allowances consigned to auction that have a vintage equal or prior to the current budget year.

(D) Allowances from the current budget year and fifty percent of Allowances from previous budget years which remained unsold at previous auctions and have not been transferred to the Cost Containment Reserve or retired will be designated for the Current Auction.

(E) Fifty percent of the Allowances from previous budget years that remained unsold shall be permanently retired.

(2) **Auction of Allowances from Future Budget Years.**

(A) This auction will be known as the Advance Auction.

(B) One quarter of the allowances allocated for Advance Auction from the budget year three years subsequent to the current calendar year will be designated for sale at each Advance Auction.

(C) The Advance Auction may include allowances which were returned to the Auction Holding Account following an Advance Auction which resulted in unsold allowances, and which are designated for auction pursuant to section 147.211(f)(3).

(d) Auction of Consigned Allowances.

(1) When the DEP withdraws compliance instruments from accounts containing allowances in excess of the holding limit, or from accounts suspended or revoked:

(A) Allowances shall be consigned to the next auction;

(B) If, after review, the DEP determines that any offset credits, or offset credits issued from a GHG ETS to which Pennsylvania has linked pursuant to subchapter 12, remaining in the entity's accounts are valid, the DEP will remove the offset credits from any holding or compliance account needed to fulfill the entity's compliance obligation. If offset credits remain in the entity's compliance account thereafter, the Executive Officer will return them to the entity's holding account.

(C) The DEP will retire any withdrawn allowances issued by the Department or by a GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 that have no vintage, offer an equal number of current budget year vintage allowances from the Auction Holding Account, and consign those allowances to the next Current Auction in place of the retired allowances that have no vintage.

(D) The DEP will retain in the Auction Holding Account any withdrawn allowances that have a vintage that is later than the current budget year, offer an equal number of current budget year vintage allowances from the Auction Holding Account, and consign those allowances to the next Current Auction in place of the retained future vintage allowances.

(2) Each consigning entity agrees to accept the auction settlement price for allowances sold at auction.

(3) Deadline for Consignment. Allowances designated for consignment pursuant must be transferred to the Auction Holding Account at least 75 days before the auction as scheduled in Appendix C.

(e) Auction of Allowances Used to Fulfill an Untimely Surrender Obligation. When the Executive Officer transfers compliance instruments used to fulfill an untimely surrender obligation to the Auction Holding Account:

(1) Allowances with a vintage year corresponding to the current or previous budget years will be designated to the Current Auction;

(2) Allowances with a vintage year corresponding to a budget year three years subsequent to the current calendar year will be designated to the Advance Auction;

(3) Allowances with a vintage corresponding to a budget year one year or two years subsequent to the current year will remain in the Auction Holding Account until their vintage corresponds to the current calendar year. They will then be designated for the Current Auction.

(4) The Executive Officer will retire any allowances issued from the Department or a GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 that have no vintage.

§ 147.211. Format for Auction of Pennsylvania GHG Allowances.

(a) Auction Bidding Format.

(1) The auction will consist of a single round of bidding.

(2) Bids will be sealed.

(3) Bid quantities must be submitted as multiples of 1,000 Pennsylvania GHG allowances.

(4) Entities registered into the Pennsylvania Cap-and-Trade Program must submit bids in whole U.S. dollars and whole cents.

(5) The allowances for auction in section 147.211(a)(3) will also include allowances from a jurisdiction operating an External GHG ETS system to which Pennsylvania has linked pursuant to subchapter 12.

(b) Auction Reserve Price Schedule.

(1) Each auction will be conducted with an auction reserve price.

- (2) No allowances will be sold at bids lower than the auction reserve price.
- (c) Method for Setting the Auction Reserve Price.

(1) The Auction Reserve Price shall be on the greater of the reserve price using the method set forth in section 147.211(c)(2) and the highest reserve price established for any External GHG ETS system to which Pennsylvania has linked pursuant to subchapter 12.

(2) Unless the Auction Reserve Price is set equal to a higher price established for any External GHG ETS system linked to Pennsylvania pursuant to subchapter 12, the reserve price shall be based upon a reserve price for calendar year 2020 equal to ten dollars (\$10.00), and shall increase each calendar year by the rate of inflation plus 10 percent of the prior year reserve price as provided in section 147.211(c), provided, however, that the auction reserve price established by this method shall not exceed the highest reserve price established for any of the programs identified in section 147.240(b) of this chapter. Beginning in 2020, and each year thereafter, the Auction Reserve Price for auctions to be conducted the following calendar year will be established and announced on the first day in December that is a business day in Pennsylvania. The Reserve Price shall be stated in U.S. dollars. The Auction Reserve Price will be calculated and announced by the Auction Administrator.

(3) The Auction Reserve Price shall be determined and announced using the following procedure.

(A) The Auction Reserve Price in U.S. dollars shall be the greater of (i) the U.S. dollar Auction Reserve Price for the previous calendar year increased annually, beginning in 2021, by 10 percent plus the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for All Urban Consumers and (ii) the highest auction reserve price established by any External GHG ETS system linked to Pennsylvania pursuant to subchapter 12.

(B) Prior to the opening of the auction window on the day of the auction, the Auction Administrator shall announce the Auction Reserve Price.

(4) The Auction Reserve Price will be announced prior to the opening of the auction window at 10 a.m. Eastern Standard Time (or Eastern Daylight Time when in effect) on the day

of the auction and will be in effect until the window closes at 1 p.m. Eastern Standard Time (or Eastern Daylight Time when in effect).

(5) The Auction Reserve Price will be announced on the first day in December that is a business day in Pennsylvania and in any jurisdiction operating an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 and the Reserve Price shall also be stated in the currency (or currencies) used in an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12.

(d) Auction Purchase Limit.

(1) The auction purchase limit is the maximum number of allowances offered at each Current and Advance Auction which can be purchased by any entity or group of entities with a direct corporate association.

(2) Purchase Limit Values.

(A) The purchase limit for covered entities, electrical distribution utilities, opt-in covered entities, or direct corporate associations containing any of these types of entities will be 25 percent of the allowances offered for auction at both the Current and Advance Auctions.

(B) The purchase limit for voluntarily associated entities or direct corporate associations comprised entirely of these entities is four percent of the allowances offered for auction at the Current and Advance Auctions.

(3) Auction Purchase Limits for Members of a Direct Corporate Association.

(A) Entities that are part of a direct corporate association must allocate a specified percentage share of the association's purchase limit to each member of the direct corporate association. The sum of the percentage shares allocated among the entities must equal one hundred percent. The purchase limit for each associated entity is its allocated percentage share multiplied by the auction purchase limit assigned to the association.

(B) For voluntarily associated entities that are part of a corporate association containing covered entities, opt-in covered entities, or electrical distribution utilities, the total purchase limit assigned to voluntarily associated entities within the corporate association must be less than or equal to four percent of the allowances to be auctioned at Current and Advance Auctions.

(e) Determination of Winning Bidders and Settlement Price. The following process shall be used to determine winning bidders, amounts won, and a single auction settlement price:

(1) Each bid will consist of a price and the quantity of allowances, in multiples of 1,000 PA GHG Allowances, desired at that price.

(2) Each bidder may submit multiple bids.

(3) Beginning with the highest bid price, bids from each bidder will be considered in declining order by price, and the auction operator shall reject a bid for a bundle of 1,000 allowances:

(A) If acceptance of the bid would result in violation of the purchase limit pursuant to sections 147.211(d) and 147.214;

(B) If acceptance of the bid would result in violation of the holding limit pursuant to section 147.220(b); or

(C) If acceptance of the bid would result in a total value of accepted bids for an auction participant greater than the value of the bid guarantee submitted by the auction participant pursuant to section 147.212(j).

(4) Bids from all bidders will be ranked from highest to lowest by price. Beginning with the highest bid and proceeding to successively lower bids, entities submitting bids at each price will be sold allowances until:

(A) The next lower bid price is less than the auction reserve price, in which case the current price becomes the auction settlement price; or

(B) The total quantity of allowances contained in the bids at the next lower bid price is greater than or equal to the number of allowances yet to be sold, in which instance, the next lower bid price becomes the auction settlement price and the procedure for resolution of tie bids in section 147.211(e)(5) shall apply.

(5) Resolution of tie bids. If the quantity of allowances contained in the bids placed at the auction settlement price is greater than the quantity of allowances available to be sold at that price, then:

(A) The Auction Administrator will calculate the share of the remaining allowances to be distributed to each entity bidding at the auction settlement price by dividing the quantity bid by that entity and accepted by the auction administrator by the total quantity of bids at the settlement price which were accepted by the Auction Administrator;

(B) The Auction Administrator will calculate the number of allowances distributed to each bidding entity by multiplying the bidding entity's share calculated in section 147.211(e)(5)(A) above by the number of allowances remaining, rounding the number down to the nearest whole number; and

(C) To distribute any remaining allowances, the Auction Administrator will assign a random number to each entity bidding at the auction settlement price. Beginning with the lowest random number, the Auction Administrator will assign one allowance to the last bundle purchased by each entity until the remaining allowances have been assigned.

(f) If the quantity of bids accepted by the Auction Administrator is less than the number of allowances offered for sale then some allowances will remain unsold.

(1) If allowances remain unsold at auction, the Auction Administrator will fulfill winning bids with allowances from consignment sources in the following order:

(A) Allowances consigned to auction pursuant to section 147.210(d)(2);

(B) Allowances redesignated to the auction pursuant to section 147.211(f)(3); and

(C) Allowances designated by DEP for auction pursuant to section 147.210(c)(1)(B) and (c)(2)(B) and (c)(2)(C).

(2) When there are insufficient winning bids to exhaust the allowances from a consignment source in section 147.211(f)(1), the auction administrator will sell an equal proportion of allowances from each consigning entity in that source as follows:

(A) The auction administrator will calculate the number of allowances sold on behalf of each consigning entity by multiplying the consigning entity's share of the total consigned allowances by the number of consigned allowances sold, rounding the number down to the nearest whole number; and

(B) To distribute any remaining allowances, the auction administrator will assign a random number to each entity consigning allowances. Beginning with the lowest random number, the auction administrator will assign one allowance to each entity until the remaining allowances have been assigned.

(3) Disposition of Allowances Designated by DEP for Auction Which Remain Unsold.

(A) Allowances designated by DEP pursuant to section 147.210(c)(1)(B) and (c)(2)(B) and (c)(2)(C) for an auction which remain unsold shall be kept in the Auction Holding Account for later auction or retired as provided herein.

(B) Allowances designated by DEP for auction which remain unsold will be re-designated for auction after two consecutive auctions have resulted in an auction settlement price above the Auction Reserve Price. If future vintage allowances remain unsold at the end of the calendar year for which they were designated for sale at Advance Auction, they will remain in the Auction Holding Account until their vintage year. They will then be designated for the Current Auction.

(C) The number of allowances re-designated to a subsequent Current or Advance Auction will not exceed 25 percent of allowances already designated by DEP for that auction. Allowances which remain unsold above that level will be held in the Auction Account for later auction.

(D) Allowances designated for Advance Auction which remain unsold until their vintage year equals the current calendar year will be designated for Current Auction pursuant to section 147.210(c)(1)(B).

(4) Disposition of Consigned Allowances Remaining Unsold at Auction. Allowances consigned to auction pursuant to section 147.221(g)(3) that remain unsold at auction will be held in the Auction Holding Account and offered for sale at each auction until sold, transferred to the Allowance Price Containment Reserve (Reserve) or retired.

(g) Transfer of Unsold Allowances to the Allowance Price Containment Reserve or retirement. Current vintage allowances designated by DEP for auction pursuant to section 147.211(f)(3) that remain unsold in the Auction Holding Account for more than 24 months will

be transferred to the Reserve or retired. At least fifty percent (50%) of allowances that remain unsold after the expiration of their vintage year shall be permanently retired. The remainder shall be transferred to the Reserve. The number of allowances in the Reserve shall be limited to 25% of the annual allowance budget for the Pennsylvania GHG Cap-and-Trade program and shall decrease as that budget decreases. Any excess allowances in the Reserve or unsold allowances exceeding the limits in the Reserve shall be permanently retired. Current vintage allowances designated by DEP pursuant to this section do not include allowances consigned to auction pursuant to section 147.210(d).

(h) The auction bidding window may be delayed, rescheduled, or cancelled due to technical systems failures.

(1) The opening of the auction bidding window may be delayed or paused for no more than one hour by the Secretary due to technical systems failures.

(2) The bidding window may be rescheduled by the Secretary due to technical systems failures.

(3) Rescheduled Auctions.

(A) The auction bidding window must be rescheduled to ensure the financial services administrator can use any bid guarantees submitted pursuant to section 147.212 prior to the expiration date required by section 147.212.

(B) No additional auction applications may be accepted.

(C) The financial services administrator will keep all bid guarantees to complete financial settlement of the auction after the rescheduled bidding window.

(D) No bid guarantees provided pursuant to section 147.212 may be amended.

(E) If technical systems failures cannot be resolved and a bidding window cannot be rescheduled to meet the requirements of this section, then the Secretary will cancel the auction bidding window.

§ 147.212. Auction Administration and Participant Application.

(a) Administration of the Auctions.

(1) The Secretary or a designated DEP Deputy Secretary may serve as Auction Administrator or the Secretary may designate an entity to serve as Auction Administrator.

(2) The Secretary or a designated DEP Deputy Secretary may serve as financial services administrator or the Secretary may designate a qualified financial services administrator to conduct all financial transactions required by this chapter.

(b) Other Jurisdictions.

(1) The Department may direct that the Pennsylvania GHG allowances designated for auction be offered through an auction conducted jointly with other jurisdictions to which Pennsylvania links pursuant to subchapter 12, provided the joint auction conforms to this chapter.

(2) Where the Department has approved a municipal program for the Pa GHG cap-and-trade program pursuant to 25 Pa. Code Chapter 133, that program may administer its own program for allowances attributable to that program or the local program may elect to have the Auction Administrator administer an auction of the allowances attributable to that program and distribute the auction revenues to the municipality or as otherwise provided under the approved municipal program.

(c) Auction Notification. At least 60 days prior to each auction, the Auction administrator shall publish the following information:

(1) The date and time of the auction;

(2) Auction application requirements and instructions;

(3) The form and manner for submitting bids;

(4) The procedures for conducting the auction;

(5) The administrative requirements for participation; and

(6) The number of allowances from Pennsylvania that will be available at the auction.

(7) For the announcement of the first quarter auction, the number of allowances to be available for sale during the calendar year and the Auction Reserve Price in effect for the calendar year pursuant to section 147.211(c).

(8) If Pennsylvania has linked to a jurisdiction operating an External GHG ETS pursuant to subchapter 12, the number of allowances in section 147.212(c)(6) will also include the allowances made available by the linked jurisdiction, if any, as well as any allowances made available by approved municipal Pa GHG cap-and-trade programs.

(d) Auction Participation Application Requirements.

(1) The Department must approve an entity's auction participant application before that entity may participate in an auction.

(2) An entity applying for approval as an auction participant must be registered into the Cap-and-Trade Program as provided in section 147.130.

(3) An entity whose holding account has been revoked or is currently suspended pursuant to section 147.311 cannot participate in an auction. An individual associated pursuant to section 147.130, 147.132, and 147.133 with an entity whose holding account has been revoked or is currently suspended pursuant to section 147.311 cannot participate in an auction.

(4) An entity will be required to complete an auction participant application at least 30 days prior to an auction in which it intends to participate. The entity must provide information and documentation including:

(A) Information and documentation regarding the corporate or other identity, ownership, and capital structure of the applicant;

(B) The existence of any direct or indirect corporate associations pursuant to sections 147.133 and 147.214(d);

(C) An allocation of the purchase limit among associated entities as defined in section 147.133, or a change in the existing allocation of the purchase limit among associated entities, if applicable;

(D) An allocation of the holding limit among associated entities as defined in section 147.133, or a change in the existing allocation of the holding limit among associated entities, if applicable; and

(E) An attestation disclosing the existence and status of any ongoing investigation or an investigation that has occurred within the last ten years with respect to any alleged violation

of any rule, regulation, or law associated with any commodity, securities, environmental, or financial market for the entity participating in the auction, and all other entities with whom the entity has a direct corporate association pursuant to section 147.133 that participate in a GHG, carbon, fuel, or electricity market. The attestation must be updated to reflect any change in the status of an investigation that has occurred since the most recent auction application attestation was submitted.

(5) An entity with any changes to the auction application information listed in subsection 147.212(d)(4) within 30 days prior to an auction may be denied participation in the auction. For the purposes of changes to indirect and direct corporate associations, this section only applies to those corporate associates with entities registered in the tracking system.

(6) Prior to participating in an auction, any primary or alternate account representative that will be submitting bids on behalf of entities eligible to participate in an auction must have already:

(A) Complied with the Know-Your-Customer requirements of section 147.134; and

(B) Submitted the additional information required by the financial services administrator contained in Appendix A of this subchapter.

(e) Maintenance and Modification of Auction Participation Approval.

(1) Once the Department has approved an entity's auction participant application, the entity need not complete another application for subsequent auctions unless there is a material change to the information contained in the approved application pursuant to section 147.212(d)(4) there is a material change in the entity's Cap-and-Trade Program registration pursuant to section 147.130, or the Department has made a determination restricting an entity's auction participation pursuant to section 147.214.

(2) An entity approved for auction participation must inform the Auction Administrator at least 30 days prior to an auction when reporting a change to the information disclosed, otherwise the entity may not participate in that auction. The change should be reported by 5 p.m. Eastern Standard Time (or Eastern Daylight Time, when in effect) on the 30th day before an auction.

(f) Auction Intent to Bid Notification Requirements. An entity that intends to participate in an auction must inform the Auction Administrator at least 30 days prior to an auction of its intent to bid in an auction, otherwise the entity may not participate in that auction.

(g) An entity approved for auction participation may not communicate information on auction participation with any entity that is not part of an association disclosed pursuant to section 147.214 or otherwise permitted by section 147.214(c), except as requested by the Auction Administrator to remediate an auction application.

(h) Protection of Confidential Information. To the extent permitted by state law, the Department, the Auction Administrator, and the financial services administrator will treat the information contained in the auction application and not listed for release pursuant to section 147.212(k)(5) as confidential business information.

(i) All bids will be considered binding offers for the purchase of allowances under the rules of the auction.

(j) Auction participants must provide a bid guarantee to the financial services administrator at least 12 days prior to the auction.

(1) The bid guarantee must be in one or a combination of the following forms:

(A) Cash in the form of a wire transfer; or

(B) An irrevocable letter of credit; or

(C) A bond.

(D) All forms of bid guarantee must be in a form and credit quality that may be accepted by the financial services administrator consistent with U.S. banking laws and bank practices.

(2) The bid guarantee submitted by any entity registered with Pennsylvania will be in U.S. dollars.

(3) A bid guarantee submitted in any form other than cash must be payable within three business days of payment request.

(4) The bid guarantee will be in the U.S. dollars.

(5) The amount of the bid guarantee must be greater than or equal to the maximum value of the bids to be submitted.

(A) The value of a set of bids equals the cumulative quantity of bids submitted at or above a price times that price. The value of the set of bids is calculated at each price at which the bidder will submit a bid.

(B) The maximum value of a set of bids is the highest value of a set of bids calculated at each price at which the bidder will submit a bid.

(C) The auction participant submits a single bid guarantee to cover bids in both the Current and Advance Auctions and the amount of the single bid guarantee must be greater than or equal to the combined maximum value of the Current and Advance Auction bids to be submitted.

(6) The bid guarantee will be made payable to the financial services administrator.

(7) The bid guarantee will expire no sooner than 26 days after the auction date.

(8) The financial services administrator will evaluate the bid guarantee and inform the auction administrator of the value of the bid guarantee once it is found to conform to this section and is accepted by the Department.

(9) If an entity has submitted more than one form of bid guarantee then the financial services administrator will apply the instruments to the unpaid balance in the order the instruments are listed in section 147.212(j)(1).

(10) The auction administrator will apply the value of the bid guarantee to the Current Auction first when accepting bids pursuant to section 147.211(e)(3). The remaining value of the bid guarantee will be used to determine acceptance of bids into the Advance Auction.

(k) After the Auction Administrator has notified the Department of the results of the auction the Department will:

(1) Review the conduct of the auction by the Auction Administrator, then certify whether the auction met the requirements of this chapter;

(2) After certification, direct the auction administrator to notify each winning bidder of the auction settlement price, the number of allowances that the bidder purchased, the bidder's total purchase cost, and the deadline and method for submitting payment.

(3) After certification, direct the financial services administrator to:

(A) Collect cash payments from winning bidders within seven days of notifying them of the auction results;

(B) Use the bid guarantee to cover payment for allowance purchases by any entity that fails to make cash payment within seven days after bidders are notified of results and place the proceeds into the Pennsylvania Treasury, such other fund as the General Assembly may hereafter designate consistent with its duty as a trustee under Article I, §27 of the Pennsylvania Constitution, or the accounts designated by municipalities with approved air pollution control programs including this cap-and-trade program;

(C) Deposit auction proceeds from sales of DEP allowances sold at auction into the Pennsylvania Treasury, such other fund as the General Assembly may hereafter designate consistent with its duty as a trustee under Article I, §27 of the Pennsylvania Constitution, or the accounts designated by municipalities with approved programs;

(D) Distribute auction proceeds to entities that consigned allowances for auction pursuant to section 147.210(d);

(E) Return any unused cash bid guarantee; and

(F) Return any bid guarantee form other than cash after receipt of payment for allowances awarded.

(G) A bid guarantee in a form other than cash may be held by the financial services administrator for multiple auctions or reserve sales upon agreement by the financial services administrator and bidder.

(4) Upon determining that the payment for allowances has been deposited into the Treasury, or transferred to entities or local governments with approved programs that consigned allowances, transfer the allowances purchased into each winning bidder's Holding Account, or to its Compliance Account if needed to comply with the holding limit;

(5) Inform each approved external GHG emissions trading system and the associated tracking system of the serial numbers of allowances purchased at auction; and

(6) Following the auction, the Department will publish at www.____ the following information:

(A) The names of the bidders;

(B) Auction settlement price; and

(C) Aggregated or distributional information on purchases with the names of the entities withheld.

§ 147.213. Sale of Allowances from the Allowance Price Containment Reserve.

(a) The Secretary or a Deputy Secretary may serve as reserve sale administrator to conduct sales from the Allowance Price Containment Reserve (Reserve) or designate an entity to serve as reserve sale administrator. The financial services administrator designated by the Secretary pursuant to section 147.212(a) will conduct the financial transactions required to operate sales from the Reserve.

(b) Entities registered in an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 are not eligible to purchase from the Pennsylvania Reserve.

(c) Only entities registered into the Pennsylvania GHG Cap-and-Trade Program as provided in sections 147.111 or 147.113 shall be eligible to purchase allowances from the Reserve. Prior to participating in a Reserve sale, any primary or alternate account representative that will be submitting bids on behalf of entities eligible to participate in Reserve sales must have already submitted any additional information required by the financial services administrator.

(d) Timing of Reserve Sales.

(1) Reserve sales shall be conducted pursuant to the schedule in Appendix C.

(A) Except for the Reserve sale immediately preceding the compliance obligation instrument surrender deadline on November 1, a Reserve sale will only be offered if the Current Auction held in the preceding quarter results in an auction settlement price greater than or equal to 60% of the Reserve Sale Price.

(B) The Reserve sale immediately preceding the compliance obligation instrument surrender on November 1 of each year will always be offered.

(C) A Reserve sale will be conducted only if at least one entity that intends to participate in the Reserve sale informs the Reserve Sale Administrator at least 20 days prior to the scheduled Reserve sale and submits a bid guarantee to the financial services administrator at least 12 days before the scheduled Reserve sale.

(2) For any Reserve sale that will be offered, the Reserve sale administrator shall provide all eligible participants with notice of the number of allowances available for sale and the terms of the sale at least 30 days prior to the sale.

(e) Reserve Sale Intent to Bid Notification Requirements. An entity that intends to participate in a reserve sale must inform the Reserve Sale Administrator at least 20 days prior to a reserve sale of its intent to bid in that reserve sale, otherwise the entity may not participate in that reserve sale.

(f) Operation of the Reserve.

(1) Determination of the Reserve Sale Price.

(A) Beginning in 2021, each year DEP will set a U.S. dollar Base Reserve Sale Price equal to the annual auction reserve price determined for that year pursuant to section 147.211(c)(3)(A), plus a fixed dollar amount. In 2021 the fixed dollar amount will equal the difference between the highest Reserve tier price for the California cap-and-trade program determined in 2020 and the Annual Auction Reserve Price for the California program determined in 2020, increased by the rate of inflation for 2020 as measured by the most recently available twelve months of the Consumer Price Index for all Urban Consumers. In each subsequent year the fixed dollar amount will be the previous year's fixed dollar amount adjusted for the rate of inflation as measured by the most recently available twelve months of the Consumer Price Index for all Urban Consumers.

(B) The Reserve Sale Price used each year will be the larger of the U.S. dollar Base Reserve Sale Price as provided in subsection (A) and the highest Reserve Sale Price (converted into U.S. dollars) in any ETS trading system to which the Pennsylvania cap-and-trade program is linked.

(2) This provision only applies to the Reserve sale immediately preceding the compliance obligation instrument surrender deadline on November 1. Pursuant to sections 147.170(i)(1) and 147.171(h)(1), allowances will be made available at the Reserve Sale Price if the amount of accepted bids exceeds the number of allowances available in the Reserve.

(A) If the quantity of allowances from sections 147.170(a) and 147.171(a) is equal to or greater than the quantity of accepted bids then all accepted bids will be filled.

(B) If the quantity of accepted bids exceeds the allowances from sections 147.170(a) and 147.171(a) allowances in the Reserve then bids will be filled through the procedure outlined in this section.

(C) The accepted bids will be filled first with allowances from sections 147.170(a) and 147.171(a) if available.

(3) The allowances in the Reserve will be sold until all accepted bids are filled or until all the allowances in the Reserve have been sold.

(4) Allowances sold pursuant to this section are immediately eligible to satisfy any compliance obligation, regardless of the vintage of the allowance.

(g) At least 12 days before the scheduled sale, an entity intending to participate in a Reserve sale must submit to the financial services administrator a bid guarantee, payable to the financial services administrator, in an amount greater than or equal to the sum of the maximum value of the bids to be submitted by the entity.

(1) The maximum value of a set of bids is the quantity bid times the Reserve Sale Price.

(2) The bid guarantee must be in one or a combination of the following forms:

(A) Cash in the form of a wire transfer; or

(B) An irrevocable letter of credit; or

(C) A bond.

(D) All forms of bid guarantee must be in a form and credit quality that may be accepted by the financial services administrator consistent with U.S. banking laws and bank practices.

(3) A bid guarantee submitted in any form other than cash must be payable within three business days of payment request.

(4) The bid guarantee will be made payable to the financial services administrator.

(5) The bid guarantee will expire no sooner than 26 days after the Reserve sale.

(6) The financial services administrator will evaluate the bid guarantee and inform the Reserve sale administrator of the value of the bid guarantee once it is found to conform to this section and is accepted by the Secretary.

(7) The Department may revise the timing of reserve sales intent to bid notification requirements and bid guarantee submittal requirements to ensure a minimum of four business days is available between the intent to bid notification and bid guarantee submittal due dates.

(h) Sale Operations.

(1) The Reserve sales window will open at 10 a.m. Eastern Standard Time (or Eastern Daylight Time, when in effect) on the day of the sale, and bids may be submitted until the window closes at 1 p.m. Eastern Standard Time (or Eastern Daylight Time, when in effect).

(A) Each bid will consist of a quantity of allowances in multiples of 1,000 allowances.

(B) An entity may submit multiple bids.

(2) The reserve sale administrator will only accept a bid for a bundle of 1,000 allowances:

(A) If acceptance of the bid would not result in violation of the holding limit pursuant to section 147.220(b); or

(B) If acceptance of the bid would not result in a total value of accepted bids for an entity greater than the value of the bid guarantee submitted by the entity pursuant to section 147.213(g).

(3) Filling Accepted Bids.

(A) For a Reserve sale not occurring immediately preceding the compliance instrument surrender on November 1, the Reserve sale will continue until either all allowances are sold from the Reserve or all the accepted bids are filled.

(B) If the sum of bids accepted by the Reserve Sale Administrator is greater than the number of allowances in the Reserve, the Reserve Sale Administrator will calculate the number of allowances distributed to each bidding entity by multiplying the bidding entity's share of the total number of accepted bids by the number of allowances in the Reserve, rounding the number to the nearest whole number. To distribute any remaining allowances, the Reserve Sale Administrator will assign a random number to each entity bidding in the Reserve sale. Beginning with the lowest random number, the Reserve Sale Administrator will assign one allowance to the last bundle purchased by each entity until the remaining allowances have been assigned.

(i) Resolution of Sales.

(1) After reviewing the conduct of the sale by the Reserve sale administrator, the Department will certify whether the Reserve sale met the requirements of this chapter.

(2) After certification of the sale results, the Department will direct the reserve sale administrator to notify Reserve sale participants of their purchases and total purchase cost.

(3) After certification of the sale results, the Department will direct the financial services administrator to:

(A) Process cash payments from participants and deposit proceeds into the Treasury up to seven days after bidders are notified of results;

(B) Use the bid guarantee to cover payment for allowance purchases by any entity that fails to make payment within seven days after bidders are notified of results and place the proceeds into the Treasury;

(C) Return any unused cash bid guarantee; and

(D) Return any bid guarantee in a form other than cash after receipt of payment for allowances awarded.

(E) A bid guarantee in a form other than cash may be held by the financial services administrator for multiple auctions or reserve sales upon agreement by the financial services administrator and bidder.

(4) Upon determining that the financial services administrator has deposited the payment for allowances into the Treasury, the Department shall transfer the allowances

purchased from the Allowance Price Containment Reserve sale into each winning bidder's compliance account.

(5) The Department shall inform each approved external GHG emissions trading system and the associated tracking system of the serial numbers of allowances sold; and

(6) The Department shall publish the sale results at www._____.

(j) Entities registered in an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12 are not eligible to purchase from the Reserve.

§ 147.214. Auction Participation and Limitations.

(a) The Department may cancel or restrict a previously approved auction participation application or reject a new application if the Department determines that an entity has:

(1) Provided false or misleading facts;

(2) Withheld material information from its application or account application information listed in section 147.130, with material meaning information that could influence a decision by the Department;

(3) Violated any part of the auction rules pursuant to subchapter 10;

(4) Violated the registration requirements pursuant to subchapter 5; or

(5) Violated the rules governing trading pursuant to subchapter 11.

(b) If the Department determines an entity has committed any of the violations listed in section 147.214(a), then:

(1) The Department may instruct the Auction Administrator to cancel a previously approved auction application or to not accept auction applications from the entity;

(2) The Department may instruct the Auction Administrator to restrict the auction application approval for any corporate associate of the entity to prevent the purchase of allowances at auction for subsequent transfer to the violator;

(3) Any cancellation or restriction imposed by the Department may be permanent or for a specified number of auctions; and

(4) The cancellation or restriction imposed by the Department shall be in addition to any other penalties, fines, and additional remedies available at law.

(c) Disclosure of Auction Participation Information.

(1) Except as provided in section 147.214(c)(2), all entities registered into the Cap-and-Trade Program pursuant to section 147.130, their direct and indirect corporate associations, and consultants and advisors as identified in section 147.223 shall not release any of the following information regarding auction participation or reserve sale participation, as applicable:

(A) Intent to participate, or not participate, at auction, and auction approval status;

(B) Bidding strategy at any auctions, including the specification of an auction settlement price or range of potential auction settlement prices at which an entity is willing to buy or sell allowances;

(C) Bid price or bid quantity information at past or future auctions; and

(D) Information on the amount of any bid guarantee provided to the financial services administrator.

(2) Auction participation information listed in section 147.214(c)(1) may be released under the following conditions:

(A) When the release is to other members of a direct corporate association not subject to auction participation restriction or cancellation pursuant to section 147.214(b),

(B) When the release is to a Cap-and-Trade Consultant or Advisor who has been disclosed to the Department pursuant to section 147.214(c)(3).

(C) When the release is made by a publicly-owned utility only as required by public accountability rules, statute, or rules governing publicly-owned utilities.

(D) When the release is to an agency that has regulatory jurisdiction over privately owned utilities in the Commonwealth of Pennsylvania of information regarding compliance instrument cost and acquisition strategy and other disclosures specifically required or authorized by the regulatory agency pursuant to any of its applicable rules, orders, or decisions. In the event of a disclosure pursuant to this section, and upon the request of the Secretary, the entity must provide within 10 business days the statutory or regulatory reference or the general order,

decision, or ruling to DEP that requires the disclosure of the specific information related to bidding strategy.

(E) When the release is to PJM, subject to PJM's requirements regarding confidential business information.

(F) When release is required by the securities laws of the United States or of a state or foreign country having jurisdiction.

(3) If an entity participating in an auction has retained the services of a Cap-and-Trade Consultant or Advisor, as defined in section 147.223, regarding auction bidding strategy, then:

(A) The entity must ensure against the Consultant or Advisor transferring the entity's information to other auction participants or coordinating the bidding strategy among participants;

(B) The entity will inform the Consultant or Advisor of the prohibition of sharing information to other auction participants and ensure the Consultant or Advisor has read and acknowledged the prohibition under penalty of perjury;

(C) The Consultant or Advisor must provide the Secretary the following information:

1. Names of the entities participating in the Cap-and-Trade Program that are being advised;
2. Description of advisory services being performed; and
3. Assurance under penalty of perjury that advisor is not transferring to or otherwise sharing information with other auction participants.

(D) The information must be received by the Secretary at least 15 days prior to an auction.

Subchapter 11: Trading and Banking

§ 147.220. Trading.

(a) The holding limit is the maximum number of Pennsylvania GHG allowances that may be held by an entity or jointly held by a group of entities with a direct corporate association, as defined in section 147.133 at any point in time.

(b) Application of the Holding Limit.

(1) The holding limit will apply to each entity registered as a covered, opt-in covered, or voluntarily associated entity pursuant to section 147.130.

(2) The holding limit calculation will not include allowances contained in exchange clearing holding accounts created pursuant to section 147.131.

(3) The holding limit calculation will not include allowances contained in Annual Allocation Holding Accounts.

(4) If the Department determines that a reported transfer request not yet recorded into the tracking system would result in an entity's holdings exceeding the applicable holding limit, then the Department shall not approve the transfer request pursuant to section 147.221(a)(1).

(5) If an entity is in compliance with the current vintage holding limit on December 31 of any year and the reclassification of future vintage allowances as current vintage allowances pursuant to section 147.220(c)(1)(C) causes it to exceed the holding limit on January 1 of the next compliance year, then:

(A) The accounts administrator will inform the entity; and

(B) The entity will have five business days to bring its account balances within the holding limit. After that, the Secretary may transfer allowances in excess of the holding limit to the Auction Holding Account for consignment to auction pursuant to section 147.210(d)(2).

(C) Allowances transferred to the Auction Holding Account for consignment will be drawn first from the entity's Holding Account and, if necessary, from the entity's Compliance Account. The order for removing allowances for consignment will be the opposite of the retirement order in section 147.156(h)(1).

(6) Penalties for Holding Limit Violations.

(A) For an entity that is out of compliance with the holding limit only as a result of the circumstances described in section 147.220(b)(5), penalties may be applied if the entity fails to bring its account balances under the holding limit within the five business day period allowed pursuant to section 147.220(b)(5)(B). Otherwise, penalties may be applied whenever the holding limit is exceeded.

(B) Penalties may be applied if the violation of the holding limit is not discovered until after a transfer that would exceed the holding limit is registered into the tracking system.

(c) The holding limit will be separately calculated to holdings of:

(1) Current Vintage Allowances. This category of allowances consists of:

(A) Allowances with a vintage year corresponding to the current or previous calendar years;

(B) Allowances from any vintage purchased from the Allowance Price Containment Reserve pursuant to section 147.213;

(C) Allowances originally purchased at the Advance Auction but of a vintage year equal or prior to the current calendar year; and

(D) Allowances issued by a GHG ETS program approved by DEP pursuant to section 147.241 that have no vintage;

(2) Future Vintage Allowances. This category of allowances consists of:

(A) Allowances that were purchased at the Advance Auction and still have a vintage year greater than the current calendar year; and

(B) Allowances with a vintage year greater than the current calendar year that were obtained through true-up allocation.

(d) The holding limit will be calculated for allowances qualifying pursuant to section 147.220(c)(1) as the sum of:

(1) The number given by the following formula:

$$\text{Holding Limit} = 0.1 \times \text{Base} + 0.025 \times (\text{Annual Allowance Budget} - \text{Base})$$

In which:

“Base” equals 25 million metric tons of CO₂e.

“Annual Allowance Budget” is the number of allowances issued for the current budget year.

(2) Limited Exemption from the Holding Limit.

(A) The limited exemption from the holding limit (limited exemption) is the maximum number of allowances that will not be included in the holding limit calculated pursuant to section 147.220(c)(1). To qualify for inclusion within the limited exemption, allowances must be placed in the entity’s Compliance Account. The limited exemption is available to covered entities and opt-in covered entities but not to voluntarily associated entities.

(B) Calculation of the limited exemption. The limited exemption for an entity that registers as a covered entity or opt-in covered entity after the effective date of this Chapter will be calculated as twice the annual emissions contained in the emissions report for the first year that the entity has a compliance obligation, provided that the emissions data report has received a positive or qualified positive emissions data verification statement for emissions that generate a compliance obligation pursuant to section 147.151.

(C) The limited exemption will be increased on November 2 of each year by the amount of emissions that generate a compliance obligation pursuant to section 147.151 that are included in the emissions data report received that year that have received a positive or qualified positive emissions data verification statement.

(D) If DEP has assigned emissions to an entity, for any year, in the absence of a positive or qualified positive emissions data verification statement, the limited exemption will be calculated using the assigned emissions. If the emission reports scheduled to be used to increase the limited exemption are not available at the time of a scheduled increase and DEP has not assigned emissions to the entity, the limited exemption will be increased by the amount of the most recently received report that has received a positive or qualified positive emissions data verification statement. If this procedure is used, the limited exemption will not be adjusted using data in the reports scheduled to be received that year until the next scheduled change in the limited exemption.

(E) After DEP has evaluated an entity's surrender of compliance instruments pursuant to section 147.156, an entity's limited exemption will be reduced to reflect any emissions obligation due during that calendar year. Following an annual surrender deadline, the limited exemption will be reduced by the amount of the annual surrender obligation due that calendar year. Following a compliance period surrender deadline, the limited exemption is reduced, starting with the oldest emissions report used to calculate the limited exemption, by the amount of emissions contained in the number of years for which a compliance obligation was due that calendar year, including emissions carried over from a previous compliance period pursuant to section 147.153(d), but not including any emissions already removed from the limited exemption following an annual surrender deadline.

(3) Petition to Adjust the Limited Exemption.

(A) Prior to October 1 of any year, a covered entity may submit to the Department evidence demonstrating an increase in emissions for that year over the previous year and request a temporary increase in the limited exemption until verified data for that year are available.

(B) The amount of the increase must be at least 250,000 metric tons CO₂e on an annualized basis.

(C) The Department will review the evidence and determine whether an adjustment is needed.

(D) If an adjustment is granted, then the limited exemption for that covered entity will be increased immediately by the amount determined by the Department.

(E) When the verified emissions data are received for the year for which an adjustment was granted, the Department will use the verified emissions value when calculating the limited exemption.

(e) The holding limit will be calculated separately for each vintage year for allowances qualifying pursuant to section 147.220(c)(2) as the number given by the following formula:

$$\text{Holding Limit} = 0.1 \times \text{Base} + 0.025 \times (\text{Annual Allowance Budget} - \text{Base})$$

In which:

“Base” equals 25 million metric tons of CO₂e.

“Annual Allowance Budget” is the number of Pennsylvania GHG allowances issued for a budget year.

(f) Application of Corporate Association Provisions to the Holding Limit.

(1) The total number of allowances held by a group of entities with a direct corporate association pursuant to section 147.133 must sum to less than or equal to the holding limits pursuant to sections 147.220(d) and (e).

(2) Calculation of the Limited Exemption for a Direct Corporate Association.

(A) An entity with a direct corporate association that is not part of a consolidated account will calculate its limited exemption as described in section 147.220(d).

(B) The limited exemption for a consolidated account is the sum of the limited exemption calculation for the entities consolidated into the account.

(3) Entities that are part of a direct corporate association that choose to opt out of account consolidation pursuant to sections 147.130(c)(1)(I) or 147.135(a) or (b) must allocate shares of the holding limit among themselves. This holding limit allocation results in each entity having a specified percentage share of the group’s holding limit. The sum of the percentage shares allocated among the entities must sum to one hundred percent.

(A) The primary account representatives or alternate account representatives of each of the associated entities must inform the accounts administrator of the allocation of the holding limit when registering pursuant to section 147.133.

(B) The holding limit allocation will remain in effect until the primary account representatives or alternate account representatives of each of the associated entities informs the accounts administrator of subsequent changes to the allocation of the holding limit.

(g) The holding limit in section 147.220(a) shall include holdings of any allowances issued by a jurisdiction operating an External GHG ETS to which Pennsylvania has linked pursuant to subchapter 12.

(h) The “Annual Allowance Budget” in section 147.220(d) is calculated as the sum for the current budget year of the annual compliance budgets of Pennsylvania and all External

GHG ETS programs to which Pennsylvania has linked pursuant to subchapter 12. The “Annual Allowance Budget” in section 147.220(e) is calculated as the sum for a budget year of the annual compliance budgets of Pennsylvania and all External GHG ETS programs to which Pennsylvania has linked pursuant to subchapter 12.

§ 147.221. Conduct of Trade.

(a) Transfers of Compliance Instruments Between Accounts.

(1) Except when a transfer is undertaken by the Department, the accounts administrator will not register a transfer of compliance instruments between accounts into the tracking system until the administrator receives a transfer request that the Department has determined meets the requirements of this chapter.

(A) To initiate the process, the primary account representative or an alternate account representative of the source account for the transfer must submit a transfer request to the accounts administrator.

(B) The primary account representative or another alternate account representative for the same entity must confirm the transfer request to the accounts administrator within two days of the initial submission of the transfer request.

(C) The primary account representative or an alternate account representative for the destination account must confirm the transfer request to the accounts administrator within the time remaining in the three days following the initial submission of the transfer request in section 147.221(a)(1)(A).

(D) The Department must determine whether the transfer request and the transaction for which the transfer request was submitted meet the requirements of this chapter based on the information available at the time of approval.

(2) The following transfers do not require confirmation by an account representative of the destination account pursuant to section 147.221(a)(1)(C).

(A) Transfers initiated by the Department.

(B) Transfers between a single entity’s holding and compliance accounts.

(3) The parties to a transfer will be in violation and penalties may apply if the above process is completed:

(A) More than three days after the initial submission of the transfer request; or

(B) More than three days after the expected termination date of the transaction agreement for which the transfer request is submitted.

(4) Except for transfers between direct corporate associates disclosed pursuant to section 147.133, an entity may not submit a transfer request to another registered entity without an existing written or recorded oral transaction agreement between the registered entities authorizing a transfer.

(b) Information Requirements for Transfer Requests. The following information must be reported to the accounts administrator as part of a transfer request before any transfer of allowances can be recorded on the tracking system:

(1) The following information must be entered into the tracking system for all transfer requests:

(A) Holding account number of the source account and identification of two individuals who are the primary account representative and/or alternate account representatives initiating the transfer request.

(B) Account number of destination account.

(C) Type, quantity, and vintage of compliance instrument.

(2) The transfer request must identify the type of transaction agreement for which the transfer request is being submitted, selecting one of the following three types:

(A) Over-the-counter agreement for the sale of compliance instruments for which delivery will take place no more than three days from the date the parties enter into the transaction agreement.

(B) Over-the counter agreement for the sale of compliance instruments for which delivery is to take place more than three days from the date the parties enter into the transaction agreement or that involve multiple transfers of compliance instruments over time or the bundled sale of compliance instruments with other products.

(C) Exchange agreements for the sale of compliance instruments through any contract arranged through an exchange or Board of Trade.

(3) A transfer request submitted for an over-the-counter agreement for the sale of compliance instruments for which delivery will take place no more than three days from the date the parties enter into the transaction agreement must provide the following information:

(A) Date the entity entered into the transaction agreement.

(B) Expected Termination Date of the transaction agreement. If completion of the transfer request process is the last term of the transaction agreement to be completed, the date the transfer request is submitted should be entered as the Expected Termination Date. If there are financial, contingency, or other terms to be settled after the transfer request is completed, the date those terms are expected to be settled should be entered as the Expected Termination Date. If the transaction agreement does not specify a date for the settlement of financial, contingency, or other terms that would be completed after the transfer request is completed, the entity may enter the Expected Termination Date as “Not Specified”.

(C) Price of the compliance instrument in U.S. dollars or Canadian dollars.

(4) A transfer request submitted for an over-the-counter agreement for the sale of compliance instruments for which delivery is to take place more than three days from the date the parties enter into the transaction agreement or that involves multiple transfers of compliance instruments over time or incorporates compliance instrument requirements with other product sales or purchases, must provide the following information:

(A) Date the entity entered into the transaction agreement.

(B) Expected Termination Date of the transaction agreement. If completion of the transfer request process is the last term of the transaction agreement to be completed, the date the transfer request is submitted should be entered as the Expected Termination Date. If there are financial, contingency, or other terms to be settled after the transfer request is completed, the date those terms are expected to be settled should be entered as the Expected Termination Date. If the transaction agreement does not specify a date for the settlement of financial, contingency, or other terms that would be completed after the transfer request is completed, the entity may enter the Expected Termination Date as “Not Specified”.

(C) Whether the transaction agreement provides for further compliance instrument transfers after the current transfer request is completed.

(D) Whether the transaction agreement provides for transfers of other products.

(E) If the transaction agreement specifies a fixed price for the compliance instruments, provide the price in U.S. dollars or Canadian dollars.

(F) If the transaction agreement sets the price as a cost base plus a margin, then provide the cost base and the margin.

(G) If the transaction agreement does not determine the price using one of the above formats, provide a brief description of the pricing method as well as the price resulting from the pricing method for the specific transfer.

(5) A transfer request submitted for an Exchange Agreement must provide the following information:

(A) Identify the exchange where the transaction is conducted.

(B) Identify the contract description code assigned by the exchange to the contract.

(C) Date of close of trading for the contract.

(D) Price at close of trading for the contract.

(6) If the transaction agreements do not contain a price for compliance instruments, entities may enter a price of zero into the transfer request if the transfer request is submitted to fulfill one of the following transaction agreement types and the entity discloses the agreement type in the transfer request.

(A) The proposed transfer is between entities with a direct corporate association.

(B) The proposed transfer is from an entity's holding account to its compliance account.

(C) The proposed transfer results from a transaction agreement that incorporates compliance instrument requirements with other product sales or purchases, and specifies a total cost or cost basis for the transaction but does not specify a price or cost basis for the sale of the compliance instruments alone.

(D) The proposed transfer is from an electricity utility to an entity operating a generation facility from which the utility obtains electricity pursuant to a long term power purchase agreement.

(E) The proposed transfer is to satisfy a transaction agreement that requires the production of a new DEP-issued offset credit and the transaction agreement does not specify a price for the DEP-issued offset credit.

(c) Parties to the transfer request agree to provide documentation about the transaction agreement for which the transfer request was submitted within five days of a request of the Department.

(1) The request for documentation may include the transaction agreement and related transaction confirmations that resulted in the transfer and must be sufficient to verify the information entered by the account representative into the fields required for the transfer request.

(2) The Department will treat the documentation as confidential business information to the extent permitted by law.

(d) Transfers Involving Exchange Clearing Holding Accounts.

(1) A request to transfer compliance instruments to an exchange clearing holding account will list the exchange clearing holding account as the destination account.

(2) All of the compliance instruments received by an exchange clearing holding account must be transferred to one or more destination accounts within five days of receiving them.

(3) A request to transfer compliance instruments to or from an exchange clearing holding account does not require confirmation by an account representative of the destination account pursuant to section 147.221(a)(1)(C).

(4) The entity receiving a transfer from an exchange clearing holding account is solely responsible for violations of the holding limit. If a transfer from an exchange clearing holding account results in a violation of the holding limit, then the Department will prevent the receiving entity from transferring allowances to another entity until the Department has investigated and determined the cause of the violation. The accounts administrator will allow the entity to transfer allowances to its compliance account if the entity can accommodate them

within its limited exemption. If the exchange clearing holding account cannot complete a transfer to a destination account, the operator of the exchange clearing holding account will notify DEP of the circumstances of the transfer within 3 calendar days of the failure to complete the transfer.

(e) Protection of Confidential Information. The Department will protect confidential information to the extent permitted by law by ensuring that the accounts administrator:

(1) Releases information on the transfer price and quantity of compliance instruments in a manner that is timely and maintains the confidentiality of the parties to a transfer;

(2) Except as needed for market oversight and investigation by the Department, protects as confidential all other information obtained through transfer requests;

(3) Protects as confidential the quantity and serial numbers of compliance instruments contained in individual entity holding accounts; and

(4) Releases information on the quantity of compliance instruments contained in compliance accounts in a timely manner that maintains the confidentiality of the identity of account holders.

(f) General Prohibitions on Trading.

(1) An entity may purchase and hold compliance instruments for later transfer to members of a direct corporate association. However, an entity cannot acquire allowances and hold them in its own holding account on behalf of another entity, including the following restrictions:

(A) An entity may not hold allowances in which a second entity has any ownership interest.

(B) An entity may not hold allowances pursuant to an agreement that gives a second entity control over the holding or planned disposition of allowances while the instruments reside in the first entity's accounts, or control over the acquisition of allowances by the first entity. Provisions specifying a date to deliver a specified quantity of compliance instruments, or specifying a procedure to determine a quantity of compliance instruments for delivery and/or a delivery date, do not violate the prohibition.

(2) A trade involving, related to, or associated with any of the following are prohibited:

(A) Any manipulative or deceptive device in violation of this chapter;

(B) A corner or an attempt to corner the market for a compliance instrument;

(C) Fraud, or an attempt to defraud any other entity;

(D) A false, misleading or inaccurate report concerning information or conditions that affects or tends to affect the price of a compliance instrument;

(E) An application, report, statement, or document required to be filed pursuant to this chapter which is false or misleading with respect to a material fact, or which omits to state a material fact necessary to make the contents therein not misleading; or

(F) Any trick, scheme, or artifice to falsify or conceal a material fact, including use of any false statements or representations, written or oral, or documents made by or provided to an entity on or through which transactions in compliance instruments occur, are settled, or are cleared.

(G) A fact is material if it could probably influence a decision by the Department.

(g) Restrictions on Registered Entities. If an entity registered pursuant to section 147.130 violates any provision specified in this chapter, the Department may:

(1) Reduce the number of compliance instruments a covered entity or opt-in covered entity may have in its holding account below the amount allowed by the holding limit pursuant to section 147.220;

(2) Increase the annual surrender obligation for a covered entity or an opt-in covered entity to a percentage of its reported and verified or assigned emissions above the 30% obligation pursuant to section 147.155;

(3) Suspend or revoke the registration of opt-in covered entities, voluntarily associated entities, and other entities registered pursuant to section 147.130;

(A) A registered entity that has had its holding account revoked or suspended may not hold compliance instruments or register with the accounts administrator for another set of accounts in any capacity. If registration is revoked or suspended the entity must sell or

voluntarily retire all compliance instruments in its holding account within 30 days of revocation; and

(B) If registration is revoked or suspended and the entity fails to sell or voluntarily retire all compliance instruments in its holding account within 30 days of revocation, the accounts administrator will transfer the remaining instruments into the Auction Holding Account for sale at auction on behalf of the entity pursuant to section 147.210(d);

(4) Limit or prohibit transfers in or out of the holding account; or

(5) All of the above.

(h) Information Reporting by Holders of Exchange Clearing Holding Accounts.

(1) Holders of exchange clearing holding accounts must make the exchange's transaction records underlying the submission of a transfer request on CITSS available to the Department within 10 calendar days of the Department's request.

(2) Holders of exchange clearing holding accounts must retain transaction records containing the information listed in 147.221(b) for 10 years.

(3) Holders of exchange clearing holding accounts are not required to include the information listed in 147.221(b)(3), (4), and (6) in transfer requests to the accounts administrator.

(i) Transfer Request Deficiencies

(1) If the accounts administrator detects a deficiency in a transfer request before it is recorded into the tracking system:

(A) The accounts administrator will inform the entities submitting the request that the transfer request is deficient and inform the Department of the deficiency;

(B) The accounts administrator will inform the entity responsible for the deficiency of the specific problem to be remedied.

(C) The entities submitting the transfer request may resubmit the request with the deficiency corrected within the time limit set pursuant to sections 147.221(a)(1)(C), 147.221(a)(3), or 147.221(a)(4); and

(D) If the entities fail to submit an acceptable transfer request within the time limit, then they must either withdraw the transfer request or submit a new transfer request. Penalties may still apply pursuant to sections 147.221(a)(3) or (a)(4).

(2) If the accounts administrator detects a deficiency in a transfer request after it is recorded into the tracking system:

(A) The accounts administrator will inform the entities submitting the request that the transfer request is deficient and inform the Department of the deficiency;

(B) If the deficiency is based on the information submitted by the representative of the source account, the Department will inform the submitting representative of the specific deficiency;

(C) If the deficiency is a violation of the holding limit, the Department will inform the primary account representative for the account listed on the transfer request as the destination account of the deficiency; and

(D) If the entities that submitted the transfer request cannot correct the deficiency within five business days after notification by the accounts administrator, the Department may instruct the accounts administrator to reverse the transfer. The correction of the deficiency within five business days ensures the Secretary will not immediately reverse the transfer, but does not prevent the Department from applying penalties for the underlying violations.

§ 147.222. Banking, Expiration, and Voluntary Retirement.

(a) Allowances Issued for a Current or Previous Compliance Period. A PA GHG allowance or an allowance issued by an approved GHG ETS pursuant to subchapter 12 may be held (“banked”) by an entity registered pursuant to section 147.130.

(b) Allowances Issued for a Future Compliance Period. A PA GHG Allowance or an allowance approved pursuant to subchapter 12 issued from an allowance budget year within a future compliance period may be held by an entity registered pursuant to section 147.130.

(c) Expiration of Compliance Instruments. A Pennsylvania compliance instrument does not expire and is not retired in the tracking system until:

(1) It is surrendered by a covered entity or opt-in covered entity and retired by the Secretary;

(2) An entity voluntarily submits the instrument to the Secretary for retirement;

(3) The instrument is retired by an approved external GHG emissions trading system to which the Cap-and-Trade Program is linked pursuant to subchapter 12; or

(4) It is a compliance instrument that has not been sold at auction or otherwise distributed and is retired as otherwise provided in this chapter.

(d) Voluntary Retirement of Compliance Instruments.

(1) An entity registered pursuant to section 147.130 may voluntarily submit any compliance instrument for retirement.

(2) To voluntarily retire a compliance instrument, the registered entity submits a transfer request naming the DEP Retirement Account as the destination account.

(A) For the sole purpose of a voluntary transfer to the Retirement Account, a transfer request may be based on a transaction agreement with an unregistered entity as long as that entity is not registered into an external GHG program or ETS, regardless of whether the external GHG program or ETS has a Retirement-Only Agreement with DEP.

(B) An entity may not transfer more than 10,000 allowances per year to the Retirement Account based on transaction agreements with a single entity without the prior approval of the Department. This limitation shall not apply to any transfer occurring pursuant to a supplemental environmental project approved by a court, the Department, the United States Environmental Protection Agency, or any other state or province or other regulatory authority with an ETS program linked to the Pennsylvania cap-and-trade program and such transfers shall be deemed approved without further Department approval.

(C) A transfer request that is based on a transaction agreement with an unregistered entity that requires immediate delivery to the Retirement Account does not violate the prohibitions contained in section 147.221(f)(1).

§ 147.223. Disclosure of Cap-and-Trade Consultants and Advisors.

(a) A “Cap-and-Trade Consultant or Advisor” is a person or entity that is not an employee of an entity registered in the Cap-and-Trade Program, but is providing the services listed in section 147.279(b)(2) of the Cap-and-Trade Regulation or the MRR in relation to the Cap-and-Trade Program or MRR and specifically for the entity registered in the Cap-and-Trade Program, regardless if the Consultant or Advisor is acting in the capacity of an offset or MRR verifier.

(b) An entity employing Cap-and-Trade Consultants or Advisors defined pursuant to 147.223(a) must disclose the following information for each Cap-and-Trade Consultant or Advisor:

(1) Information to identify the Cap-and-Trade Consultant or Advisor, including:

(A) Name;

(B) Contact information;

(C) Physical work address of the Cap-and-Trade Consultant or Advisor; and

(D) Employer, if applicable.

(c) The entity must disclose the information pursuant to section 147.223(b) to the Secretary:

(1) When registering pursuant to section 147.130;

(2) Within 30 days of entering into a contract with a Cap-and-Trade Consultant or Advisor pursuant to section 147.223(a);

(3) Within 30 days of a change to the information disclosed on Consultants or Advisors.

Subchapter 12: Linkage to External Greenhouse Gas Emissions Trading Systems

§ 147.240. General Requirements.

(a) A compliance instrument issued by an external greenhouse gas emissions trading system (GHG ETS) may be used to meet the requirements of this Chapter if the external GHG ETS and the compliance instrument have been approved pursuant to this section, including approval by rule, or section 147.241.

(b) Compliance instruments issued by the following authorities or jurisdictions may be used to meet the requirements of this Chapter without further action under section 147.241 provided those authorities or jurisdictions agree to accept PA GHG allowances to satisfy compliance obligations under their respective programs (subject to section 147.240(d)), as long as the Department determines that these programs continue to reduce their respective emissions caps on a trajectory to achieve a balance of GHG emissions and natural uptake of GHGs or sequestration in long term sinks (i.e. net zero emissions) by the fifth decade of the Twenty-first Century and the requirements of the programs do not change in a way that would promote leakage:

(1) The states participating in the Regional Greenhouse Gas Initiative (“RGGI”);

(2) The State of California and linked programs, including, without limitation the Canadian Provinces of Quebec and Ontario, so long as they remain linked with the California cap-and-trade program;

(3) The State of Virginia’s cap-and-trade program, so long as it is adopted in a form that permits trading with entities subject to the RGGI program; and

(4) Any authority or jurisdiction with an ETS program that has been accepted by California, RGGI or Virginia as a linked or equivalent program such that the ETS compliance instruments issued by that authority or jurisdiction may be used to satisfy the requirements of the California, RGGI or Virginia programs.

(c) The Department shall make a finding that the programs identified under this section continue to meet the requirements of section 147.240(b) and have not changed in a way that the findings under section 147.241(a) could not be satisfied six months before the commencement of each compliance period. The Department shall publish the finding in the

Pennsylvania Bulletin. If the Department finds that any external GHG ETS program no longer meets said requirements, compliance instruments issued by said external GHG ETS program after said finding may no longer be used to satisfy the requirements of this Chapter.

(d) The Department shall, until the end of the first full three-year compliance period following the effective date of this chapter, accept compliance instruments issued by any authority or jurisdiction identified in section 147.240(b), without a requirement that that authority or jurisdiction accept Pennsylvania compliance instruments, if the compliance instruments of the other jurisdiction or authority may satisfy requirements for the surrender of compliance instruments applicable to electricity generating units supplying electricity within PJM. The compliance instruments governed by this subsection shall be limited to compliance instruments with a vintage year after the effective date of this chapter and before the end of the first full compliance period. Any compliance instruments accepted pursuant to this subsection shall be permanently retired in accordance with the requirements of the program that issued those compliance instruments.

§ 147.241. Procedures for Approval of Other External GHG ETS.

(a) The Department may approve a linkage with an external GHG ETS in addition to those set forth in section 147.240(b) after making the following findings and publishing the findings in the Pennsylvania Bulletin:

(1) The external GHG ETS includes an emissions cap that is reduced on a trajectory to achieve a balance of GHG emissions and natural uptake of GHGs or sequestration in long term sinks (i.e. net zero emissions) by the fifth decade of the Twenty-first Century;

(2) At a minimum, the external GHG ETS requires the surrender of compliance instruments from all fossil-fuel-fired electricity generating units in the jurisdiction;

(3) The external GHG ETS does not authorize the creation and use of emissions offsets from sectors that are not subject to the requirement for surrender of compliance instruments under the external program but are subject to the requirements of this chapter unless the external program's emissions cap for covered sectors is reduced commensurately with the provision for the creation and use of offsets;

(4) The external GHG ETS will accept Pennsylvania allowances to satisfy its requirements;

(5) Linkage with the external GHG ETS will not result in leakage that will undermine the effectiveness of the Pennsylvania program;

(6) The external GHG ETS includes controls on issuance, transfers and holding of compliance instruments consistent with those in this Chapter, so that linkage will not undermine the effectiveness of the Pennsylvania program.

(b) Compliance instruments issued by a linked GHG ETS may be used to meet a compliance obligation under this chapter subject to any conditions or limitations established by the Department in its approval.

(c) The Department shall make a finding that the programs identified under this section continue to meet the requirements of section 147.240(b) and have not changed in a way that the findings under section 147.241(a) could not be satisfied six months before the commencement of each compliance period. The Department shall publish the finding in the Pennsylvania Bulletin. If the Department finds that any external GHG ETS program no longer meets said requirements, compliance instruments issued by said external GHG ETS program after said finding may no longer be used to satisfy the requirements of this Chapter.

§ 147.242. Interchange of Compliance Instruments with Linked External Greenhouse Gas Emissions Trading Systems.

(a) Once a linkage is approved (including automatic approval by rule), a compliance instrument issued by the approved external GHG ETS, as specified in this section, may be used to meet a compliance obligation under this Chapter.

(b) An allowance issued by an approved external GHG ETS and specified in this section is not subject to the quantitative usage limit specified in section 147.154.

(c) An offset credit or sector-based credit issued by an external GHG ETS is subject to the quantitative usage limit specified in section 147.154, when used to meet a compliance obligation under this Chapter.

(d) Once a linkage is approved, a compliance instrument issued by Pennsylvania may be used to meet a compliance obligation within the approved External GHG ETS.

(e) Once a linkage is approved, a compliance instrument issued by the linked jurisdiction may be used to meet a compliance obligation in Pennsylvania.

(f) The administrator of the approved External GHG ETS must agree to inform the Department of any of the serial numbers of Pennsylvania compliance instruments that the External GHG ETS accepts for compliance.

(g) The Department will agree to inform the appropriate official in the approved External GHG ETS of any of the serial numbers of compliance instruments accepted by Pennsylvania for compliance.

(h) The Department will register into the Retirement Account compliance instruments issued by Pennsylvania that are used for compliance within the approved External GHG ETS, along with information identifying the External GHG ETS actually retiring the compliance instruments.

§ 147.243. Linked External GHG ETS or External GHG Program.

(a) Covered or opt-in covered entities may use compliance instruments issued by an external GHG ETS to which the Department has approved a Retirement-Only Limited Linkage pursuant to section 147.244 to meet their compliance obligation under this chapter.

(b) Entities registered in an external GHG Program may arrange to retire Pennsylvania compliance instruments for purposes of compliance in their own external GHG program if DEP has approved a Retirement-Only Agreement with the external GHG Program pursuant to section 147.245.

§ 147.244. Retirement-Only Limited Linkage.

(a) The Department may approve a Retirement-Only Limited Linkage with an external GHG ETS pursuant to the procedure in section 147.241.

(1) A Retirement-Only Limited Linkage allows Pennsylvania covered or opt-in covered entities to arrange for the retirement of compliance instruments in the linked GHG ETS and to obtain approval from the Department for credit towards their compliance obligation.

(2) The Department approval will specify the types of compliance instruments from the linked GHG ETS that may be used to meet a compliance obligation under this chapter.

(3) The Department approval may specify limitations on the use of compliance instruments from the linked GHG ETS, such as quantitative use restrictions.

(b) Administration.

(1) The linkage agreement will ensure that purchases, transfers, and retirements of compliance instruments by Pennsylvania registered entities in the linked GHG ETS will follow the rules of that system.

(2) The linkage agreement will require the external GHG ETS to provide the accounts administrator with documentation on the compliance instruments retired by Pennsylvania entities on the linked GHG ETS at the time of each Pennsylvania compliance event.

§ 147.245. Retirement-Only Agreements With External GHG Program.

(a) The Department may approve a Retirement-Only Agreement with an external GHG program.

(1) A Retirement-Only Agreement allows entities registered with an external GHG program to arrange retirement of Pennsylvania compliance instruments for credit towards their compliance obligation in the external GHG program.

(2) The Retirement-Only Agreement will specify the types of compliance instruments eligible for retirement.

(3) The Retirement-Only Agreement may contain limitations on the retirement of Pennsylvania compliance instruments by entities registered with the external GHG program.

(b) Administration.

(1) The Accounts Administrator will create an External GHG Program Holding Account under the control of the Department pursuant to section 147.131(b)(7).

(2) Entities registered with an external GHG program may not register with Pennsylvania for the purpose of retiring Pennsylvania compliance instruments for compliance credit with their own GHG program, regardless of whether that program has a Retirement-Only Agreement or other linkage agreement with Pennsylvania.

(c) Conduct of Transactions Agreements and Transfer Requests Under a Retirement-Only Agreement.

(1) An entity registered with an external GHG program with a Retirement-Only Agreement may enter into a purchase transaction agreement with an entity registered in Pennsylvania requiring the Pennsylvania entity to transfer a number of eligible Pennsylvania compliance instruments to the External GHG Program Holding Account.

(2) The Pennsylvania entity will file a transfer request identifying the External GHG Program Holding Account as the destination account. The transfer request will include a field containing the purchasing entity's ID code as specified by the entity's external GHG program.

(3) Upon receipt and verification that the transfer has met the requirements of this Chapter, the Department will transfer the compliance instruments to the Retirement Account. This transfer request will include the purchasing entity's ID code as specified by the entity's external GHG program.

(4) The accounts administrator will provide the administrator of the external GHG program with documentation on the compliance instruments retired in Pennsylvania's tracking system by entities registered into the external GHG program when the administrator of the external GHG program needs the information to conduct a compliance event.

Subchapter 13: DEP Offset Credits and Registry Offset Credits

§ 147.270. General Requirements for DEP Offset Credits and Registry Offset Credits.

An Offset Project Operator or Authorized Project Designee must ensure the requirements for DEP offset credits and registry offset credits are met as follows:

- (a) A registry offset credit must:
 - (1) Represent a GHG emission reduction or GHG removal enhancement that is real, additional, quantifiable, permanent, verifiable, and enforceable;
 - (2) Result from the use of a Compliance Offset Protocol that meets the requirements of section 147.272 and is either approved by the Department pursuant to section 147.271 or approved by any ETS trading system to which the Pennsylvania cap-and-trade program is linked;
 - (3) Result from an offset project that meets the requirements specified in section 147.273;
 - (4) Result from an offset project that is listed pursuant to section 147.275;
 - (5) Result from an offset project that follows the monitoring, reporting and record retention requirements pursuant to section 147.276;
 - (6) Result from an offset project that is verified pursuant to sections 147.277 through 147.278; and
 - (7) Be issued pursuant to section 147.280.1 by an Offset Project Registry approved pursuant to section 147.286.
- (b) A DEP offset credit must meet the requirements in sections 147.270(a)(1) through (a)(6) and:
 - (1) Be issued pursuant to section 147.281.1;
 - (2) Be registered pursuant to section 147.282; and
 - (3) When used for compliance under this chapter, be subject to the quantitative usage limit pursuant to section 147.154.

§ 147.271. Procedures for Approval of Compliance Offset Protocols.

(a) The Department shall provide public notice of and opportunity for public comment prior to approving any Compliance Offset Protocols, including updates or modifications to existing Compliance Offset Protocols.

(b) All Compliance Offset Protocols shall be reviewed and periodically revised, if needed, in compliance with the Pennsylvania Administrative Procedure Act, if applicable.

§ 147.272. Requirements for Compliance Offset Protocols.

(a) To be approved by the Department, a Compliance Offset Protocol must:

(1) Accurately determine the extent to which GHG emission reductions and GHG removal enhancements are achieved by the offset project type;

(2) Establish data collection and monitoring procedures relevant to the type of GHG emissions sources, GHG sinks, and GHG reservoirs for that offset project type;

(3) Establish a project baseline that reflects (i) three years of actual data for emissions of the type to be reduced or the capture of carbon to be enhanced from within the project boundary, or (ii), if such data is not available, a baseline that is conservatively modeled based on the known and quantified character of the relevant facilities or activities within the project boundary and the best available data with respect to comparable facilities or activities in the region where the project is located;;

(4) Account for activity-shifting leakage and market-shifting leakage for the offset project type, unless the Compliance Offset Protocol stipulates eligibility conditions for use of the Compliance Offset Protocol that eliminate the risk of activity-shifting and/or market-shifting leakage;

(5) Account for any uncertainty in quantification factors for the offset project type;

(6) Ensure GHG emission reductions and GHG removal enhancements are permanent;

(7) Include a mechanism to ensure permanence of GHG removal enhancements for sequestration offset project types;

(8) Establish the length of the crediting period pursuant to section 147.272(b) for the relevant offset project type; and

(9) Establish the eligibility of projects using standard criteria and quantify GHG reductions and GHG removal enhancements using the best available baseline assumptions (to the extent assumptions are necessary and appropriate), emission factors, and monitoring methods.

(b) Crediting Periods. The crediting period for a non-sequestration offset project must be no less than 7 years and no greater than 10 years, unless specified otherwise in a Compliance Offset Protocol. The crediting period for a sequestration offset project must be no less than 10 years and no greater than 30 years.

(c) Geographic Applicability. A Compliance Offset Protocol must specify where the protocol is applicable. The geographic boundary must be within the United States or United States Territories.

§ 147.273. Requirements for Offset Projects Using DEP Compliance Offset Protocols.

(a) General Requirements for Offset Projects. To qualify under the provisions set forth in this chapter, an Offset Project Operator or Authorized Project Designee must ensure that an offset project:

(1) Meets all the requirements in a Compliance Offset Protocol approved by the Board pursuant to section 147.271;

(2) Meets the following additionality requirements, as well as any additionality requirements in the applicable Compliance Offset Protocol, as of the date of Offset Project Commencement:

(A) The activities that result in GHG reductions and GHG removal enhancements (i) are not required by law, regulation, or any legally binding mandate applicable in the offset project's jurisdiction, (ii) would not be subject to a requirement to retire compliance instruments under this Article 147 if conducted in Pennsylvania, and (iii) are or will be conducted in compliance with all applicable laws, regulations and legally binding mandates;

(B) The Offset Project Commencement date occurs after the effective date of this chapter, unless otherwise specified in the applicable Compliance Offset Protocol, except as provided in section 147.273(c); and

(C) The GHG reductions and GHG removal enhancements resulting from the offset project exceed the project baseline calculated by the applicable version of the Compliance Offset Protocol under which the offset project has been listed pursuant to section 147.275 as set forth in the following:

1. California Compliance Offset Protocol Ozone Depleting Substances Projects, October 20, 2011, and Compliance Offset Protocol Ozone Depleting Substances Projects, November 14, 2014, which are hereby incorporated by reference;
2. California Compliance Offset Protocol Livestock Projects, October 20, 2011, and Compliance Offset Protocol Livestock Projects, November 14, 2014, which are hereby incorporated by reference;
3. California Compliance Offset Protocol Urban Forest Projects, October 20, 2011, which is hereby incorporated by reference;
4. California Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, Compliance Offset Protocol U.S. Forest Projects, November 14, 2014, and Compliance Offset Protocol U.S. Forest Projects, June 25, 2015, which are hereby incorporated by reference;
5. California Compliance Offset Protocol Mine Methane Capture Projects, April 25, 2014, which is hereby incorporated by reference;
6. Offset Projects approved by the RGGI program to the extent that they relate to projects that they relate to projects' whose emissions are not covered by this regulation and will not otherwise reduce demand for allowances, including those for landfill methane capture, sulfur hexafluoride, forestry or afforestation, end-use efficiency in a jurisdiction that does not require the surrender of allowances for fossil fuel distribution, and avoided agricultural methane;
7. A compliance offset protocol that DEP shall develop before the effective date of this regulation for offsets created by abandoned minelands reclamation, including the control of mine fires and the control and prevention of fires in abandoned gob and culm piles, which may include the credit for projects initiated before the effective date of this chapter;
8. A compliance offset protocol that DEP shall develop within two years of the proposal of this regulation for offsets created by the capture and geologic sequestration of emissions from the combustion of biomass;

9. All Offset Project hereafter approved by any ETS trading system to with the Pennsylvania cap-and-trade program is linked, provided that the project does not result in double counting by providing an allowance for a project whose implementation will otherwise reduce demand for that allowance.

(D) The Offset Project Operator or Authorized Project Designee may transition an offset project to the most recently incorporated version of the Compliance Offset Protocol by updating the listing information in an Offset Project Data Report pursuant to section 147.276. Projects may only transition at the initial submission of the Offset Project Data Report for a reporting period to DEP or the Offset Project Registry. An offset project that transitions to a new version of the Compliance Offset Protocol during a crediting period will continue in the same crediting period and not start a new crediting period.

(E) The offset project must meet all the requirements in this Regulation for the applicable version of the Compliance Offset Protocol under which the offset project has been listed pursuant to 147.275 or under which the offset project has been transitioned to pursuant section 147.273(a)(2)(D).

(F) The applicable version of the Compliance Offset Protocol is the version under which the offset project has been listed pursuant to section 147.275 or transitioned to pursuant section 147.273(a)(2)(D).

(G) If any law, regulation, or legally binding mandate requiring GHG emission reductions or GHG removal enhancements comes into effect in Pennsylvania, in a linked jurisdiction pursuant to section 147.243, or in a jurisdiction outside Pennsylvania, affecting the offset project, during an offset project's crediting period, then the offset project is eligible to continue to receive DEP offset credits for those GHG emission reductions and GHG removal enhancements for the remainder of the offset project's crediting period, but the offset project may not renew that crediting period. If an offset project has not been listed prior to the law, regulation, or legally binding mandate going into effect, or the law, regulation, or legally binding mandate goes into effect before the offset project's crediting period renews, then only emission reductions or removal enhancements that are in excess of what is required to comply with those laws, regulations, and/or legally binding mandates are eligible for DEP offset credits.

(3) Is located in the United States or United States Territories.

(b) Local, Regional, State, and National Regulatory Compliance and Environmental Impact Assessment Requirements. An Offset Project Operator or Authorized Project Designee must fulfill all local, regional, state, and national requirements on environmental impact assessments that apply based on the offset project location. In addition, an offset project must also fulfill all local, regional, state, and national environmental and health and safety and land use laws and regulations that apply based on the offset project location and that directly apply to the offset project, including as specified in a Compliance Offset Protocol. The project is considered out of regulatory compliance if the project activities during the Reporting Period were subject to enforcement action by a regulatory oversight body, although whether such enforcement action has occurred is not the only consideration DEP may use in determining whether a project is out of regulatory compliance.

(1) An offset project using a protocol from sections 147.273(a)(2)(C)1., 2., or 5. that is out of regulatory compliance is not eligible to receive DEP or registry offset credits for GHG reductions or GHG removal enhancements that occurred during the period that the offset project is out of regulatory compliance. The Offset Project Operator or Authorized Project Designee must provide documentation indicating the beginning and end of the time period that the offset project is out of regulatory compliance to the satisfaction of DEP.

(A) The time period that the offset project is out of regulatory compliance begins on the date that the activity which led to the offset project being out of regulatory compliance actually began and not necessarily the date that the regulatory oversight body first became aware of the issue. For determining the initial date of the offset project being out of regulatory compliance the Offsets Project Operator or Authorized Project Designee must provide one or more of the following to DEP:

1. Documentation from the relevant local, state, or federal regulatory oversight body that expressly identifies the precise start date of the offset project being out of regulatory compliance. Documentation must include evidence of the start date such as CEMS or other monitoring data, engineering estimates, satellite imagery, witness statements, or other reasonable method to aid in the identification of the precise start date; or

2. Documentation of the date of the last inspection by the relevant local, state, or federal regulatory oversight body that did not indicate the offset project was out of regulatory

compliance for the activity in question. The project will be considered out of regulatory compliance beginning the day after the inspection.

3. If the last inspection described in section 147.273(b)(1)(A)2. above was prior to the beginning of the Reporting Period, or if documentation regarding the date the project was out of regulatory compliance is not provided as set forth in sections 147.273(b)(1)(A)(1) or (2) above to the satisfaction of DEP, then the time period that the offset project is out of regulatory compliance, for purposes of the Reporting Period, commences at the beginning of the Reporting Period.

(B) For determining the end date when the offset project returned to regulatory compliance, the Offset Project Operator or Authorized Project Designee must provide documentation from the relevant local, state, or federal regulatory oversight body stating that the offset project is back in regulatory compliance. The date when the offset project is deemed to have returned to regulatory compliance is the date that the relevant local, state, or federal regulatory oversight body determines that the project is back in regulatory compliance. This date is not necessarily the date that the activity ends or the device is repaired, and may include time for the payment of fines or completion of any additional requirements placed on the offset project by the regulatory oversight body, as determined by the regulatory oversight body. If the relevant regulatory oversight body does not provide a written determination regarding the date when the project returned to regulatory compliance to the satisfaction of DEP, then for purposes of the applicable Reporting Period, the Offset Project Operator or Authorized Project Designee must use the end of the Reporting Period for the end date when the offset project returned to regulatory compliance.

(C) Nothing in this section precludes the invalidation of DEP offset credits issued for previous or subsequent Reporting Periods if DEP determines that the offset project was out of regulatory compliance in previous or subsequent Reporting Periods. The offset project will continue to be deemed out of regulatory compliance in subsequent Reporting Periods until the Offset Project Operator or Authorized Project Designee provides the documentation demonstrating regulatory compliance identified in section 147.273(b)(1)(B) to DEP.

(D) DEP's written determination and any supporting documents from the regulatory oversight body relating to the offset project being out of regulatory compliance and the timeframe identified for removal from the Reporting Period will be made public.

(E) For determining GHG emission reductions or GHG removal enhancements for the Reporting Period as modified to reflect any period the offset project was out of regulatory compliance, the Offset Project Operator or Authorized Project Designee must remove the days when the project was out of regulatory compliance from the modeled or measured project baselines for projects using a protocol in sections 147.273(a)(2)(C)2. or 5. The entire calendar day during which any portion of the project was not in regulatory compliance must be removed from the project baseline. For projects using a protocol in section 147.273(a)(2)(C)1., the entire destruction(s) under a Certificate of Destruction that contains any time the project is out of regulatory compliance must be removed.

(2) An offset project using a protocol from sections 147.273(a)(2)(C)3., 4., or 6., is not eligible to receive DEP or registry offset credits for GHG reductions or GHG removal enhancements for the entire Reporting Period if the offset project is not in compliance with regulatory requirements directly applicable to the offset project during the Reporting Period.

§ 147.274. Authorized Project Designee.

(a) General Requirements for Designation of Authorized Project Designee. An Offset Project Operator may designate an entity as an Authorized Project Designee at the time of offset project listing or any time after offset project listing as long as it meets the requirements of section 147.274(b).

(1) The Offset Project Operator may assign ownership rights of DEP offset credits or registry offset credits to the following entities at the time of registry offset credit or DEP offset credit issuance pursuant to sections 147.280.1 and 147.281, respectively:

- (A) Authorized Project Designee; or
- (B) Any other third party not otherwise prohibited by this chapter.

(2) The director or officer, as identified in section 147.130(c)(1)(B), of the Offset Project Operator may delegate responsibility to the Authorized Project Designee for performing or meeting all the requirements of sections 147.275, 147.276, 147.277, 147.277.1, 147.277.2,

147.280, 147.280.1, 147.281, 147.281.1, and, where the Authorized Project Designee is specifically identified, the requirements in sections 147.283, 147.285, on behalf of the Offset Project Operator.

(A) If an Authorized Project Designee is designated, the Authorized Project Designee will be responsible for performing all activities to meet the requirements in section 147.274(a)(2) and will be the main point of contact with regard to the offset project for the Offset Project Registry and DEP. The Offset Project Operator, however, is ultimately responsible for ensuring compliance with the requirements of this chapter and the applicable Compliance Offset Protocol. In addition, the Offset Project Operator retains its ability to perform any activities required under this chapter, including signing documents and attestations.

(B) If an Authorized Project Designee is designated, the Offset Project Operator must designate an individual of the Authorized Project Designee as a Primary Account Representative or Alternate Account Representative on the Offset Project Operator's tracking system account before the Authorized Project Designee may act on behalf of the Offset Project Operator or submit any documentation to the Offset Project Registry and DEP. Only an individual authorized on the Offset Project Operator's tracking system account may sign any documents or attestations to DEP on behalf of the Offset Project Operator for an offset project.

(C) Consultants. An Offset Project Operator or Authorized Project Designee may use a consultant to prepare documents for submittal by the Offset Project Operator or Authorized Project Designee to the Offset Project Registry or DEP. However, a consultant may not sign any documents or attestations on behalf of the Offset Project Operator or Authorized Project Designee. A consultant may only communicate with DEP or the Offset Project Registry in conjunction with the Offset Project Operator or Authorized Project Designee, and the Offset Project Operator or Authorized Project Designee must be included in all communications, whether written or verbal, between DEP or the Offset Project Registry and the consultant regarding the offset project.

(b) Modifications to Authorized Project Designee and Activities. An Offset Project Operator may modify or change an Authorized Project Designee, or any other third party authorized pursuant to section 147.274(a)(1) for a listed offset project once within each calendar

year after the offset project has been listed by DEP or an Offset Project Registry by submitting a request, in writing, to DEP or an Offset Project Registry.

§ 147.275. Listing of Offset Projects Using DEP Compliance Offset Protocols.

(a) General Requirements for Offset Project Operators or Authorized Project Designees Who Are Submitting an Offset Project for Listing. Before an offset project can be listed by DEP or an Offset Project Registry the Offset Project Operator and its Authorized Project Designee, if applicable, must:

- (1) Register with DEP pursuant to section 147.130; and
- (2) Not be subject to any Holding Account restrictions imposed pursuant to section 147.311.

(b) If the offset project is not listed by DEP, it must be listed by an Offset Project Registry approved pursuant to section 147.286.

(c) General Requirements for Offset Project Listing. For offset projects being listed by DEP or an Offset Project Registry in an initial or renewed crediting period, the Offset Project Operator and any Authorized Project Designees approved pursuant to section 147.274 must:

- (1) Attest, in writing, to DEP as follows:

“I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania the GHG reductions and/or GHG removal enhancements for [project] from [date] to [date] will be measured in accordance with the [appropriate DEP Compliance Offset Protocol] and all information required to be submitted to DEP is true, accurate, and complete.”;

- (2) Attest, in writing, to DEP as follows:

“I understand I am voluntarily participating in the Pennsylvania Greenhouse Gas Cap-and-Trade Program under 25 Pa. Code Chapter 147, and by doing so, I am now subject to all regulatory requirements and enforcement mechanisms of this program and subject myself to the jurisdiction of Pennsylvania as the exclusive venue to resolve any and all disputes arising from the enforcement of provisions in this chapter.”;

- (3) Attest in writing to DEP as follows:

“I understand that the offset project activity and implementation of the offset project must be in accordance with all applicable local, regional, and national environmental and health and safety laws and regulations that apply to the offset project location. I understand that offset projects are not eligible to receive DEP or registry offset credits for GHG reductions and GHG removal enhancements that are not in compliance with the requirements of the Cap-and-Trade Program.”;

(4) Provide all documentation required pursuant to section 147.275(e) to DEP or an Offset Project Registry; and

(5) Disclose GHG reductions and GHG removal enhancements issued credit by any voluntary or mandatory programs for the same offset project being listed or any GHG reductions and GHG removal enhancements used for any GHG mitigation requirement.

(d) The attestations in section 147.275(c)(1), 147.275(c)(2), and 147.275(c)(3) must be provided to an Offset Project Registry with the listing information, if being listed with an Offset Project Registry, or to DEP if being listed with DEP.

(e) Offset Project Listing Information Requirements. Before an offset project is publicly listed for an initial or renewed crediting period the Offset Project Operator or Authorized Project Designee must provide the listing information in the most recent version of a Compliance Offset Protocol for that offset project type as set forth in and incorporated by reference. The following constitute the currently approved and future required offset protocols:

(1) California Compliance Offset Protocol Ozone Depleting Substances Projects, November 14, 2014;

(2) California Compliance Offset Protocol Livestock Projects, November 14, 2014;

(3) California Compliance Offset Protocol Urban Forest Projects, October 20, 2011;

(4) California Compliance Offset Protocol U.S. Forest Projects, June 25, 2015;

(5) California Compliance Offset Protocol Mine Methane Capture Projects, April 25, 2014;

(6) Offset Projects approved by the RGGI program to the extent that they relate to projects that they relate to projects' whose emissions are not covered by this regulation and will

not otherwise reduce demand for allowances, including those for landfill methane capture, sulfur hexafluoride, forestry or afforestation, end-use efficiency in a jurisdiction that does not require the surrender of allowances for fossil fuel distribution, and avoided agricultural methane;

(7) A compliance offset protocol that DEP shall develop before the effective date of this regulation for offsets created by abandoned minelands reclamation, including the control of mine fires and the control and prevention of fires in abandoned gob and culm piles, which may include the credit for projects initiated before the effective date of this chapter; and

(8) A compliance offset protocol that DEP shall develop within two years of the proposal of this regulation for offsets created by the capture and geologic sequestration of emissions from the combustion of biomass.

(9) All Offset Projects hereafter approved by any ETS trading system to with the Pennsylvania cap-and-trade program is linked

(f) Review of Offset Project Listing Information. DEP and/or the Offset Project Registry will review the offset project listing information submitted pursuant to section 147.275(e) for completeness.

(g) Notice of Completeness for Offset Project Listing Information. The Offset Project Operator or Authorized Project Designee will be notified after review by DEP or the Offset Project Registry, within 30 calendar days of receiving the complete and accurate listing information, that the offset project may be listed. If DEP or the Offset Project Registry determine that the information submitted pursuant to section 147.275(e) is incomplete or that a denial of the project listing is required, DEP or the Offset Project Registry will notify the Offset Project Operator or Authorized Project Designee of this determination within 30 calendar days of receiving the listing information from the Offset Project Operator or Authorized Project Designee.

(h) Timing for Offset Project Listing in an Initial Crediting Period. The Offset Project Operator or Authorized Project Designee must submit the information in section 147.275(e) to DEP or an Offset Project Registry no later than the date at which the Offset Project Operator or Authorized Project Designee submits its required Offset Project Data Report for its first Reporting Period under a Compliance Offset Protocol to DEP or an Offset Project Registry

pursuant to section 147.276. The Offset Project Operator or Authorized Project Designee must submit the listing information in section 147.275(e) to DEP or an Offset Project Registry no later than one year after Offset Project Commencement. If the Offset Project Operator or Authorized Project Designee does not submit the listing information in section 147.275(e) for the offset project to DEP or an Offset Project Registry within one year of Offset Project Commencement, it will be ineligible to be listed under a Compliance Offset Protocol and will not be issued registry offset credits and DEP offset credits pursuant to sections 147.280 and 147.281.

(i) Listing Status of Offset Projects in an Initial Crediting Period. After the Offset Project Operator or Authorized Project Designee submits the offset project for listing in an initial crediting period and submits the required documentation pursuant to section 147.275(e), and DEP or the Offset Project Registry has reviewed the offset project listing information for completeness, the offset project listing status will be “Proposed Project.” If the offset project is not accepted for listing by an Offset Project Registry, the Offset Project Operator or Authorized Project Designee may request DEP to make a final determination if the offset project meets the requirements in section 147.275 to be listed for an initial crediting period by the Offset Project Registry. In making this determination, DEP may consult with the Offset Project Registry before making the final determination.

(j) Timing for Offset Project Listing in a Renewed Crediting Period. The Offset Project Operator or Authorized Project Designee must submit the information in section 147.275(e) for a renewed crediting period to DEP or an Offset Project Registry no earlier than 18 months and no later than 9 months before conclusion of the initial crediting period or a previous renewed crediting period.

(k) Listing Status of Offset Projects in a Renewed Crediting Period. After the Offset Project Operator or Authorized Project Designee submits the offset project for listing in a renewed crediting period and submits the required documentation pursuant to section 147.275(e), and DEP or the Offset Project Registry has reviewed the offset project listing information for completeness, the offset project listing status will be “Proposed Renewal.” The verification body must assess that the offset project meets the additionality requirements in section 147.273(a)(2)(A) and 147.273(a)(2)(C) as of the date of the commencement of the renewed crediting period when conducting offset verification services for the first Reporting Period of a

renewed crediting period. If the offset project is not accepted for listing by an Offset Project Registry, the Offset Project Operator or Authorized Project Designee may request DEP to make a final determination if the project meets the requirements in section 147.275 to be listed for a renewed crediting period by the Offset Project Registry. In making this determination, DEP may consult with the Offset Project Registry before making the final determination.

(l) Once DEP or an Offset Project Registry approves an offset project for listing, the listing information is considered final, and may not be changed unless the Offset Project Operator changes during the crediting period.

(1) If the Offset Project Operator changes during the crediting period the new Offset Project Operator or Authorized Project Designee must submit updated listing information for the information that pertains to the Offset Project Operator and Authorized Project Designee, if applicable, to DEP or the Offset Project Registry within 30 calendar days of the change.

(2) If the Offset Project Operator changes during the crediting period the new Offset Project Operator or Authorized Project Designee must submit the information required pursuant to section 147.275(c) to DEP or the Offset Project Registry within 30 calendar days of the change.

(m) Limitations for Crediting Period Renewals. A crediting period may be renewed if the offset project meets the requirements for additionality pursuant to section 147.273(a)(2) and in the applicable Compliance Offset Protocol.

(1) The crediting period for non-sequestration offset projects may be renewed twice for the length of time identified by the Compliance Offset Protocol.

(2) Sequestration offset projects are not subject to any renewal limits.

(n) Transferring an Offset Project. If the Offset Project Operator or Authorized Project Designee transfers an offset project listed with DEP or an Offset Project Registry to DEP or another Offset Project Registry:

(1) DEP or the Offset Project Registry that originally listed the offset project must change the offset project listing status on its registry system to “Transferred DEP Project.”

(A) If the only action taken by the Offset Project Operator or the Authorized Project Designee was to have the listing documentation for the offset project approved by DEP or the

original Offset Project Registry, DEP or the original Offset Project Registry must retain the information related to the offset project on its website for the duration of one year before it is removed from the registry system. If the listing documentation was only submitted by the Offset Project Operator or Authorized Project Designee, but not approved by DEP or the original Offset Project Registry, DEP or the original Offset Project Registry does not need to retain the submitted listing documentation.

(B) If a verification body submitted an Offset Verification Statement, DEP or the original Offset Project Registry must retain the information related to the offset project on its website for the duration of the offset project life.

(C) DEP or the new Offset Project Registry must retain the listing date and all listing information as approved by DEP or the original Offset Project Registry. If the offset project has not undergone initial verification, the Offset Project Commencement date may change as a result of verification activities only.

(2) The Offset Project Operator or Authorized Project Designee must submit the original listing documentation reviewed and accepted by DEP or the original Offset Project Registry pursuant to this section to the new Offset Project Registry. The Offset Project Operator or Authorized Project Designee may only make changes to the listing documentation pursuant to section 147.275(1).

(3) The Offset Project Operator or Authorized Project Designee may not transfer an offset project to DEP or another Offset Project Registry once a Notice of Offset Verification Services has been submitted for a Reporting Period(s) pursuant to section 147.277.1(b)(1) or during the course of offset verification services for a Reporting Period(s). Once a Notice of Offset Verification Services has been submitted, the offset verification services must be completed for the applicable Reporting Period(s) before the Offset Project Operator or Authorized Project Designee may transfer the offset project to DEP or another Offset Project Registry. Once the offset verification services are completed for the applicable Reporting Period(s), the Offset Project Operator or Authorized Project Designee may transfer the offset project to DEP or another Offset Project Registry.

(n) Limitations for Listing Forest Offset Projects. Once a forest offset project has been issued registry offset credits pursuant to sections 147.280 and 147.280.1 or DEP offset

credits pursuant to sections 147.281 and 147.281.1, no other offset project may be listed with a Project Area including any land within the previously listed geographic boundary of the previous offset project unless the previous offset project was terminated due to an unintentional reversal or unless otherwise specified in a Compliance Offset Protocol.

§ 147.276. Monitoring, Reporting, and Record Retention Requirements for Offset Projects.

(a) General Requirements for Monitoring Equipment for Offset Projects. The Offset Project Operator or Authorized Project Designee must employ the procedures in the Compliance Offset Protocol for monitoring measurements and project performance for offset projects. All required monitoring equipment must be maintained and calibrated in a manner and at a frequency required by the equipment manufacturer, unless otherwise specified in the applicable Compliance Offset Protocol. All modeling, monitoring, sampling, or testing procedures must be conducted in a manner consistent with the applicable procedure.

(b) The Offset Project Operator or Authorized Project Designee must use the missing data methods as provided in a Compliance Offset Protocol for that offset project type, if provided and applicable.

(c) An Offset Project Operator or Authorized Project Designee must put in place all monitoring equipment or mechanisms required by the applicable version of the Compliance Offset Protocol for that offset project type as set forth in:

(1) California Compliance Offset Protocol Ozone Depleting Substances Projects, October 20, 2011 and Compliance Offset Protocol Ozone Depleting Substances Projects, November 14, 2014;

(2) California Compliance Offset Protocol Livestock Projects, October 20, 2011 and Compliance Offset Protocol Livestock Projects, November 14, 2014;

(3) California Compliance Offset Protocol Urban Forest Projects, October 20, 2011;

(4) California Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, Compliance Offset Protocol U.S. Forest Projects, November 14, 2014 and Compliance Offset Protocol U.S. Forest Projects, June 25, 2015;

(5) California Compliance Offset Protocol Mine Methane Capture Projects, April 25, 2014; and

(6) Offset Projects approved by the RGGI program to the extent that they relate to projects that they relate to projects' whose emissions are not covered by this regulation and will not otherwise reduce demand for allowances, including those for landfill methane capture, sulfur hexafluoride, forestry or afforestation, end-use efficiency in a jurisdiction that does not require the surrender of allowances for fossil fuel distribution, and avoided agricultural methane.

(7) A compliance offset protocol that DEP shall develop before the effective date of this regulation for offsets created by abandoned minelands reclamation, including the control of mine fires and the control and prevention of fires in abandoned gob and culm piles, which may include the credit for projects initiated before the effective date of this chapter.

(8) A compliance offset protocol that DEP shall develop within two years of the proposal of this regulation for offsets created by the capture and geologic sequestration of emissions from the combustion of biomass.

(9) All Offset Project hereafter approved by any ETS trading system to with the Pennsylvania cap-and-trade program is linked, provided that the project does not result in double counting by providing an allowance for a project whose implementation will otherwise reduce demand for that allowance.

(d) Offset Project Reporting Requirements. An Offset Project Operator or Authorized Project Designee shall submit an Offset Project Data Report to DEP or an Offset Project Registry for each Reporting Period as defined in section 147.002. Each Offset Project Data Report must cover a single Reporting Period. Reporting Periods must be contiguous; there must be no gaps in reporting once the first Reporting Period has commenced. If the Offset Project Operator or Authorized Project Designee fails to submit an Offset Project Data Report, then the Offset Project will be considered terminated and not eligible for DEP offset credits. An Offset Project Data Report may be submitted after the deadline identified in section 147.276(d)(8), but before the end of the next Reporting Period, to maintain continuous reporting; however, no DEP offset credits will be issued for the GHG emission reduction or removal enhancements quantified and reported in the Offset Project Data Report pursuant to section 147.276(d)(9). For projects developed under the Compliance Offset Protocol in section 147.273(a)(2)(C)1., there may be one

Offset Project Data Report submitted for each offset project and the Offset Project Data Report may cover up to a maximum of 12 months of data. The Offset Project Operator or Authorized Project Designee must submit an Offset Project Data Report to DEP or an Offset Project Registry within 28 months of listing their offset project pursuant to section 147.275 and must also meet all other applicable deadlines pertaining to submittal of the Offset Project Data Report. If the Offset Project Operator or Authorized Project Designee does not submit an Offset Project Data Report to DEP or an Offset Project Registry within 28 months of listing an offset project, then the Offset Project Operator or Authorized Project Designee must update the listing information in the Offset Project Data Report to reflect the most recent version of the Compliance Offset Protocol for that project type in order to remain eligible to be issued DEP offset credits. If an Offset Project Data Report that does not meet the 28-month deadline also fails to meet the deadline in section 147.276(d)(8), an Offset Project Data Report covering the Reporting Period must be submitted using the most recent version of the Compliance Offset Protocol; however, no DEP offset credits will be issued for the GHG emission reductions or removal enhancements, pursuant to section 147.276(d)(9). For forestry offset projects, when an Offset Project Data Report is not filed within the deadline specified in section 147.276(d)(8), the values used for $AC_{\text{onsite},y-1}$ and $BC_{\text{onsite},y-1}$ in the Offset Project Data Report for the following Reporting Period will be the $AC_{\text{onsite},y}$ and $BC_{\text{onsite},y}$ values reported in the untimely Offset Project Data Report for the preceding Reporting Period. The Offset Project Data Report shall contain the information required by the applicable version of the Compliance Offset Protocol for that offset project type as set forth in:

- (1) California Compliance Offset Protocol Ozone Depleting Substances Projects, October 20, 2011 and Compliance Offset Protocol Ozone Depleting Substances Projects, November 14, 2014;
- (2) California Compliance Offset Protocol Livestock Projects, October 20, 2011 and Compliance Offset Protocol Livestock Projects, November 14, 2014;
- (3) California Compliance Offset Protocol Urban Forest Projects, October 20, 2011;
- (4) California Compliance Offset Protocol U.S. Forest Projects, October 20, 2011, Compliance Offset Protocol U.S. Forest Projects, November 14, 2014, and Compliance Offset Protocol U.S. Forest Projects, June 25, 2015;

(5) California Compliance Offset Protocol Mine Methane Capture Projects, April 25, 2014;

(6) Offset Projects approved by the RGGI program to the extent that they relate to projects that they relate to projects' whose emissions are not covered by this regulation and will not otherwise reduce demand for allowances, including those for landfill methane capture, sulfur hexafluoride, forestry or afforestation, end-use efficiency in a jurisdiction that does not require the surrender of allowances for fossil fuel distribution, and avoided agricultural methane;

(7) A compliance offset protocol that DEP shall develop before the effective date of this regulation for offsets created by abandoned minelands reclamation, including the control of mine fires and the control and prevention of fires in abandoned gob and culm piles, which may include the credit for projects initiated before the effective date of this chapter; and

(8) A compliance offset protocol that DEP shall develop within two years of the proposal of this regulation for offsets created by the capture and geologic sequestration of emissions from the combustion of biomass.

(9) All Offset Project hereafter approved by any ETS trading system to with the Pennsylvania cap-and-trade program is linked, provided that the project does not result in double counting by providing an allowance for a project whose implementation will otherwise reduce demand for that allowance.

(10) The Offset Project Operator or Authorized Project Designee must attest, in writing, to DEP as follows:

“I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania the GHG reductions and/or GHG removal enhancements for [project] from [date] to [date] are measured in accordance with the [appropriate DEP Compliance Offset Protocol] and all information required to be submitted to DEP in the Offset Project Data Report is true, accurate, and complete.”

This attestation must be provided with each version of the Offset Project Data Report to an Offset Project Registry if the offset project is listed with an Offset Project Registry, or to DEP if the offset project is listed with DEP.

(11) All Offset Project Data Reports must be submitted within four months after the conclusion of each Reporting Period.

(12) If an Offset Project Data Report is not submitted to DEP or an Offset Project Registry by the applicable reporting deadline, the GHG reductions and GHG removal enhancements quantified and reported in the Offset Project Data Report are not eligible to be issued DEP offset credits pursuant to section 147.281.

(13) Each version of an Offset Project Data Report submitted to DEP or an Offset Project Registry must specify the version number and the date submitted.

(e) Requirements for Record Retention for Offset Projects. An Offset Project Operator or Authorized Project Designee must meet the following requirements:

(1) The Offset Project Operator or Authorized Project Designee must retain the following documents:

(A) All information submitted as part of the Offset Project Data Report;

(B) Documentation of the offset project boundary, including a list of all GHG emissions sources, GHG sinks, and GHG reservoirs included in the offset project boundary and the project baseline, and the calculation of the project baseline, project emissions, GHG emission reductions, and GHG removal enhancements;

(C) Fuel use and any other underlying measured or sampled data used to calculate project baseline emissions, GHG emission reductions, and GHG removal enhancements for each source, categorized by process and fuel, or material type;

(D) Documentation of the process for collecting fuel use or any other underlying measured or sampled data for the offset project and its GHG emissions sources, GHG sinks, and GHG reservoirs for quantifying project baseline emissions, project emissions, GHG emission reductions, and GHG removal enhancements;

(E) Documentation of all project baseline emissions, project emissions, GHG emission reductions, and GHG removal enhancements;

(F) All point of origin and chain of custody documents required by a Compliance Offset Protocol, if applicable;

(G) All chemical analyses, results, and testing-related documentation for material and sources used for inputs to project baseline emissions, project emissions, GHG emission reductions, and GHG removal enhancements;

(H) All model inputs or assumptions used for quantifying project baseline emissions, project emissions, GHG emission reductions, and GHG removal enhancements;

(I) Any data used to assess the accuracy of project baseline emissions, GHG emission reductions, and GHG removal enhancements from each offset project GHG emissions source, GHG sink, and GHG reservoir, categorized by process;

(J) Quality assurance and quality control information including information regarding any measurement gaps, missing data substitution, calibrations or maintenance records for monitoring equipment, or models providing data for calculating project baseline emissions, project emissions, GHG emission reductions, and GHG removal enhancements;

(K) A detailed technical description of any offset project continuous measurement/monitoring system, including documentation of any findings and approvals by federal, state, and local agencies;

(L) Raw and aggregated data from any measurement system;

(M) Documentation of any changes over time and the log book on tests, down-times, calibrations, servicing, and maintenance for any measurement/monitoring equipment providing data for project baseline calculations, project emissions, GHG emission reductions, and GHG removal enhancements;

(N) For sequestration offset projects, documentation of inventory methodologies and sampling procedures including all calculation methodologies and equations used, and any data related to plot sampling; and

(O) Any other documentation or data required to be retained by a Compliance Offset Protocol, if applicable.

(2) Documents listed in section 147.276(e)(1) associated with the preparation of an Offset Project Data Report shall be retained in paper, electronic, or other usable format for a minimum of 15 years following the issuance of DEP offset credits related to that Offset Project

Data Report. All other documents shall be retained in paper, electronic, or other usable format for a minimum of 15 years.

(3) The documents retained pursuant to this section must be sufficient to allow for the verification of each Offset Project Data Report.

(4) Upon request by DEP or an Offset Project Registry, the Offset Project Operator or Authorized Project Designee must provide to DEP or an Offset Project Registry all documents pursuant to this section, including data used to develop an Offset Project Data Report within 10 calendar days of the request.

(f) General Procedure for Interim Data Collection. This section only applies if a Compliance Offset Protocol does not already include methods, or does not include a specific method for the data in question, for collecting or accounting for data in the event of missing data due to an unforeseen breakdown of gas or fuel analytical monitoring equipment or other data collection systems.

(1) In the event of an unforeseen breakdown of offset project data monitoring equipment and gas or fuel flow monitoring devices required for the GHG emission reductions and GHG removal enhancement estimation, DEP may authorize an Offset Project Operator or Authorized Project Designee to use an interim data collection procedure if DEP determines that the Offset Project Operator or Authorized Project Designee has satisfactorily demonstrated that:

(A) The breakdown may result in a loss of more than 20 percent of the source's data for the year covered by an Offset Project Data Report;

(B) The data monitoring equipment cannot be promptly repaired or replaced without shutting down a process unit significantly affecting the offset project operations, or that the monitoring equipment must be replaced and replacement equipment is not immediately available;

(C) The interim procedure will not remain in effect longer than is reasonably necessary for repair or replacement of the malfunctioning data monitoring equipment; and

(D) The request was submitted within 30 calendar days of the breakdown of the data monitoring equipment.

(2) An Offset Project Operator or Authorized Project Designee seeking approval of an interim data collection procedure must, within 30 calendar days of the monitoring equipment breakdown, submit a written request to DEP that includes all of the following:

- (A) The proposed start date and end date of the interim procedure;
- (B) A detailed description of what data are affected by the breakdown;
- (C) A discussion of the accuracy of data collected during the interim procedure compared with the data collected under the Offset Project Operator's or Authorized Project Designee's usual equipment-based method; and
- (D) A demonstration that no feasible alternative procedure exists that would provide more accurate emissions data.

(3) DEP may limit the duration of the interim data collection procedure or include other conditions for approval.

(4) Data collected pursuant to an approved interim data collection procedure shall be considered captured data for purposes of compliance with a Compliance Offset Protocol. When approving an interim data collection procedure, DEP shall determine whether the accuracy of data collected under the procedure is reasonably equivalent to data collected from properly functioning monitoring equipment, and if it is not, the relative accuracy to assign for purposes of assessing possible offset material misstatement under section 147.277.1(b)(3)(Q) of this chapter.

§ 147.277. Verification of GHG Emission Reductions and GHG Removal Enhancements from Offset Projects.

(a) General Requirements. An Offset Project Operator or Authorized Project Designee must obtain the services of an DEP-accredited verification body for the purposes of verifying Offset Project Data Reports submitted under this chapter.

(b) Schedule for Verification of Non-Sequestration Offset Projects. The verification of GHG emission reductions for non-sequestration offset projects that produce greater than or equal to 25,000 metric tons of GHG reductions must be performed on a Reporting Period basis and cover the Reporting Period for which the most recent Offset Project Data Report was submitted unless otherwise specified in a Compliance Offset Protocol. For Reporting Periods in which an Offset Project Data Report for a non-sequestration offset project shows that the offset

project produced fewer than 25,000 metric tons of GHG reductions in a Reporting Period, the Offset Project Operator or Authorized Project Designee may choose to perform verification that covers two consecutive Reporting Periods, even if for the subsequent Reporting Period the offset project produced greater than or equal to 25,000 metric tons of GHG reductions. If an Offset Project Data Report results in zero GHG emission reductions, the Offset Project Operator or Authorized Project Designee may defer verification until the offset project produces an Offset Project Data Report that no longer results in zero GHG emission reductions.

(c) Schedule for Verification of Sequestration Offset Projects. An initial verification of GHG emission reductions and GHG removal enhancements for all sequestration offset projects must be performed following the first Reporting Period and cover one Reporting Period. After the first Reporting Period, verification must be conducted at least once every six years and may cover up to six Reporting Periods for which Offset Project Data Reports were submitted. After an initial verification with a Positive Offset Verification Statement, reforestation offset projects and urban forest offset projects that meet the requirements of the applicable Compliance Offset Protocol may defer the second verification for twelve years, but verification of Offset Project Data Reports must be performed at least once every six years thereafter. For offset projects that do not renew their crediting period, verification must still be conducted at least once every six years for the remainder of the project life. However, after a successful full offset verification of an Offset Project Data Report indicating that Actual Onsite Carbon Stocks (in MTCO_{2e}) are at least 10% greater than the Actual Onsite Carbon Stocks reported in the final Offset Project Data Report of the final crediting period that received a positive Offset Verification Statement, the next full offset verification service may be deferred for twelve years. An offset project that has deferred verification for twelve years must resume conducting a full verification at least once every six years if it receives an Adverse Offset Verification Statement.

(d) Timing for Submittal of Offset Verification Statements to DEP or an Offset Project Registry. Any Offset Verification Statement must be received by DEP or an Offset Project Registry within eleven months after the conclusion of the Reporting Period for which offset verification services were performed, except for Reporting Periods for which verification is deferred in accordance with this section. If the Offset Verification Statement is not submitted to DEP or an Offset Project Registry by the verification deadline, the GHG reductions and GHG removal enhancements quantified and reported in the Offset Project Data Report are not eligible

to be issued DEP offset credits or registry offset credits. The verification body must issue one Offset Verification Statement for each Offset Project Data Report that it verifies for the Offset Project Operator or Authorized Project Designee.

§ 147.277.1. Requirements for Offset Verification Services.

(a) Rotation of Verification Bodies. An offset project shall not have more than any six out of nine consecutive Reporting Periods verified by the same verification body or offset verification team member(s), unless otherwise specified in section 147.277.1(a)(1) or (a)(2). The rotation requirements in this section are applied between the Offset Project Operator, Authorized Project Designee, if applicable, and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee, if applicable, and the verification body and offset verification team member(s) on an offset project basis.

(1) For offset projects developed under the Compliance Offset Protocol in section 147.273(a)(2)(C)(1), the following shall apply: Neither a verification body nor offset verification team member may conduct offset verification services for more than any six out of nine consecutive offset projects developed by any given Offset Project Operator, or developed on behalf of that Offset Project Operator by any Authorized Project Designee, or any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee. For offset projects developed under the Compliance Offset Protocol in section 147.273(a)(2)(C)(1), the order of consecutive projects is determined by the project commencement dates. For this provision an offset project is defined by any activities reported in an Offset Project Data Report, and is applied to offset projects listed by the Offset Project Operator and Authorized Project Designee, if applicable.

(2) For reforestation offset projects developed under, and that meet the requirements of, the Compliance Offset Protocol in section 147.273(a)(2)(C)(4), and urban forest offset projects developed under, and that meet the requirements of, the Compliance Offset Protocol in section 147.273(a)(2)(C)(3), the following shall apply: An Offset Project Operator or Authorized Project Designee that has deferred the second verification for 6 to 12 years may have up to 13 Offset Project Data Reports verified by the same verification body and offset verification team member(s). If an Offset Project Operator or Authorized Project Designee has not deferred the second verification for more than 6 years, the requirements in section 147.277.1(a) for rotation of

verification bodies and offset verification team member(s) shall apply. An Offset Project Operator or Authorized Project Designee may contract with a previous verification body or offset verification team member(s) only if at least three consecutive Offset Project Data Reports for the offset project have been verified by a different verification body(ies) and offset verification team member(s) before the previous verification body and offset verification team member(s) is selected again. When rotating verification bodies and offset verification team members under this provision, the rotation requirements must also apply to any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee, if applicable.

(b) Offset Verification Services. Offset Verification Services shall be subject to the following requirements.

(1) Notice of Offset Verification Services for Offset Projects. Before offset verification services, as defined in section 147.277.1(b)(3), may begin, the Offset Project Operator or Authorized Project Designee must submit the Offset Project Data Report to DEP or an Offset Project Registry, and the verification body must submit a Notice of Offset Verification Services to DEP and an Offset Project Registry, if applicable. The verification body may begin offset verification services for the Offset Project Operator or Authorized Project Designee 10 calendar days after the Notice for Offset Verification Services is received by DEP and the Offset Project Registry. The verification body may not conduct the site visit until at least 30 calendar days after the Notice for Offset Verification Services is received by DEP and the Offset Project Registry, or earlier, if the earlier site visit date is approved by DEP in writing. The Notice of Offset Verification Services must include the following information:

(A) The name of the offset project type, including the length of the offset project crediting period, and title of the Compliance Offset Protocol used to implement the offset project;

(B) A list of staff who will be designated to provide offset verification services as part of an offset verification team, including the names of each designated staff member, the lead verifier, independent reviewer, all subcontractors, and a description of the roles and responsibilities each team member will have during the offset verification process;

(C) Documentation that the offset verification team has the skills required to provide offset verification services for the Offset Project Operator or Authorized Project Designee. At

least one offset verification team member must be accredited by DEP as an offset project specific verifier for an offset project of that type; and

(D) General information on the Offset Project Operator or Authorized Project Designee, including:

1. The name of the Offset Project Operator or Authorized Project Designee, including contact information, address, telephone number, and email address;
2. The locations that will be subject to offset verification services;
3. The date(s) of on-site visits, with address and contact information; and
4. A brief description of expected offset verification services to be performed, including expected completion date.

(2) If any information submitted pursuant to sections 147.277.1(b)(1)(B) and 147.277.1(b)(1)(D) changes after the Notice for Offset Verification Services is submitted to DEP and the Offset Project Registry, if applicable, and before offset verification services begin, the verification body must notify DEP and the Offset Project Registry by submitting an updated Notice of Offset Verification Services as soon as the change is made, but, at least five working days prior to the start of offset verification services, unless otherwise approved by DEP in writing. If any information submitted pursuant to sections 147.277.1(b)(1)(B) and 147.277.1(b)(1)(D) changes during offset verification services, the verification body must notify DEP and the Offset Project Registry, if applicable, within 10 working days. In either instance, the Notice of Offset Verification Services must be resubmitted to DEP and the Offset Project Registry, as applicable. If DEP and the Offset Project Registry, if applicable, request revisions to the Notice of Offset Verification Services, the verification body must resubmit the revised Notice of Offset Verification Services within 10 working days of such request, or if there is a reason the verification body cannot submit the revisions within 10 working days, the verification body must communicate to DEP and the Offset Project Registry in writing as to the reasons why and get approval from the Offset Project Registry or DEP for an extension.

(3) Offset verification services must include the following:

(A) Offset Verification Plan. The Offset Project Operator or Authorized Project Designee must submit the following information necessary to develop an Offset Verification Plan to the offset verification team:

1. Information to allow the offset verification team to develop a general understanding of offset project boundaries, operations, project baseline emissions, and Reporting Period GHG reductions and GHG removal enhancements;
2. Information regarding the training or qualifications of personnel involved in developing the Offset Project Data Report;
3. The name and date of the Compliance Offset Protocol used to quantify and report project baselines, GHG reductions, GHG removal enhancements, and other required data as applicable in the Compliance Offset Protocol; and
4. Information about any data management system, offset project monitoring system, and models used to track project baselines, GHG reductions, GHG removal enhancements, and other required data as applicable in the Compliance Offset Protocol.

(B) Timing of Offset Verification Services. The Offset Verification Plan submitted pursuant to section 147.277.1(b)(3)(A) shall also include the following information:

1. Dates of proposed meetings and interviews with personnel related to the offset project;
2. Dates of proposed site visits;
3. Types of proposed document and data reviews; and
4. Expected date for completing offset verification services.

(C) Planning Meetings with the Offset Project Operator or Authorized Project Designee. The offset verification team must discuss with the Offset Project Operator or Authorized Project Designee the scope of the offset verification services and request any information and documents needed for initiating offset verification services. The offset verification team must review the documents submitted and plan and conduct a review of original documents and supporting data for the Offset Project Data Report. Information regarding planning meetings may be included in the offset verification plan, but is not required.

Any discussions or meetings to secure an offset verification services contract or collect preliminary project documents to bid the offset verification services may occur prior to submitting the Notice of Offset Verification Services pursuant to section 147.277.1(b)(1).

(D) Site Visits for Offset Projects. For a non-sequestration offset project, at least one accredited offset verifier in the offset verification team, including the offset project specific verifier, must make at least one site visit for each Reporting Period that an Offset Project Data Report is submitted, except for those non-sequestration offset projects for which the Offset Project Data Reports qualify for a two-year offset verification period pursuant to section 147.277(b). In this case, at least one offset verifier in the offset verification team, including the offset project specific verifier, must make a site visit each time offset verification services are performed; offset verification services for non-sequestration offset projects would include one or two Reporting Periods, depending on whether verification is eligible to be deferred pursuant to section 147.277(b). For projects using protocols in section 147.273(a)(2)(C)1, 2, or 3, if the project is no longer in operation and all destruction devices, metering and monitoring equipment has been removed, the site visit can occur at the offices of the Offset Project Operator, or Authorized Project Designee. Such a site visit cannot be used for reducing the invalidation timeframe in section 147.285. For a forest or urban forest offset project, at least one accredited offset verifier in the offset verification team, including the offset project specific verifier, must make a site visit every year that offset verification services are provided, except for those offset projects approved for less intensive verification, for which a site visit must be performed at least once every six years. A site visit is also required after the first Reporting Period of an offset project under a Compliance Offset Protocol and after the first Reporting Period for each renewed crediting period under a Compliance Offset Protocol. Any site visit performed under this section must be conducted after the Offset Project Operator or Authorized Project Designee submits its Offset Project Data Report to DEP or an Offset Project Registry. During the required verification, the offset verification team member(s) must conduct the following, and document or explain how each requirement was checked and fulfilled in the detailed verification report:

1. During the initial verification conducted following the first Reporting Period of the crediting period the offset verification team members must complete all of the following requirements, either during the required site visit or as part of a desk review:

- a. Assess offset project eligibility and that the offset project meets the requirements for additionality according to section 147.273 and the applicable Compliance Offset Protocol;
- b. Review the information submitted for listing pursuant to section 147.275 and determine if it is complete and accurate;
- c. Confirm that the offset project boundary is appropriately defined;
- d. Review project baseline calculations and modeling;
- e. Assess the operations, functionality, data control systems, and review GHG measurement and monitoring techniques; and
- f. Confirm that all applicable eligibility criteria to design, measure, establish the chain of custody, and monitor the offset project conforms to the requirements of the applicable Compliance Offset Protocol.
- g. All criteria pertaining to the eligibility of the offset project must be assessed during the first site visit in the first Reporting Period of each crediting period. All eligibility criteria must be met and are not subject to sampling. If any of the eligibility criteria are not met, the project would be ineligible for crediting and receive an Adverse Offset Verification Statement.

2. During the initial verification conducted following the first Reporting Period of the crediting period and each subsequent verification the offset verification team must complete all of the following requirements, either during the required site visit or as part of a desk review:

- a. Check that all offset project boundaries, GHG emissions sources, GHG sinks, and GHG reservoirs in the applicable Compliance Offset Protocol are identified appropriately;
- b. Review and understand the data management systems used by the Offset Project Operator or Authorized Project Designee to track, quantify, and report GHG reductions, GHG removal enhancements, or other data required as applicable in the Compliance Offset Protocol. This includes reviewing data collection processes and procedures, sampling techniques and metering accuracy, quality assurance/quality control processes and procedures, and missing data procedures. The offset verification team member(s) must evaluate the uncertainty and effectiveness of these systems;

- c. Interview key personnel involved in collecting offset project data and preparing the Offset Project Data Report;
- d. Make direct observations of equipment for data sources and equipment supplying data for GHG emission sources in the sampling plan determined to be high risk;
- e. Collect and review other information that, in the professional judgment of the team, is needed in the offset verification process;
- f. Confirm the offset project conforms with all local, state, or federal environmental regulatory requirements pursuant to section 147.273(b), including health and safety regulations; and
- g. Review all chain of custody documents as required in the Compliance Offset Protocol, if applicable.
- h. If the offset project is found by the offset verification team to not meet the requirements of section 147.277.1(b)(3)(D)(2)f, the offset project is ineligible to receive DEP offset credits or registry offset credits for some or all GHG reductions and GHG removal enhancements quantified and reported in the Offset Project Data Report.

(E) The offset verification team must review offset project operations to identify applicable GHG emissions sources, project emissions, GHG sinks, and GHG reservoirs required to be included and quantified in the Offset Project Data Report as required by the applicable Compliance Offset Protocol. This must include a review of each type of GHG emissions source, GHG sink, and GHG reservoir to ensure that all GHG emissions sources, GHG sinks, and GHG reservoirs required to be reported for the offset project are properly included in the Offset Project Data Report.

(F) An Offset Project Operator or Authorized Project Designee must make available to the offset verification team all information and documentation used to calculate and report project baseline and project GHG emissions, GHG reductions, and GHG removal enhancements and other information required by the applicable Compliance Offset Protocol.

(G) Sampling Plan for Offset Project Data Reports. As part of confirming the Offset Project Data Report, the offset verification team must develop a sampling plan that meets the following requirements:

1. The offset verification team must develop a sampling plan based on a strategic analysis developed from document reviews and interviews to assess the likely nature, scale, and complexity of the offset verification services for an Offset Project Operator or Authorized Project Designee. The analysis must review the inputs for the development of the submitted Offset Project Data Report, the rigor and appropriateness of the GHG data management systems, and the coordination within an Offset Project Operator's or Authorized Project Designee's organization to manage the operation and maintenance of equipment and systems used to develop the Offset Project Data Reports;

2. The offset verification team must include a ranking of GHG emissions sources, GHG sinks, and GHG reservoirs within the offset project boundary by amount of contribution to total CO_{2e} emissions, GHG reductions, and GHG removal enhancements, and a ranking of GHG emissions sources, GHG sinks, or GHG reservoirs with the largest calculation uncertainty; and

3. The offset verification team must include a qualitative narrative of uncertainty risk assessment in the following areas as applicable to the Compliance Offset Protocol:

- a. Data acquisition equipment;
- b. Data sampling and frequency;
- c. Data processing and tracking;
- d. Project baseline and project GHG emissions, GHG reductions, and GHG removal enhancement calculations;
- e. Data reporting; and
- f. Management policies or practices in developing Offset Project Data Reports.

(H) After completing the analysis in section 147.277.1(b)(3)(G), the offset verification team must include in the sampling plan a list which includes the following:

1. GHG emissions sources, GHG sinks, and GHG reservoirs that will be targeted for document reviews to ensure conformance with the Compliance Offset Protocol and data checks as specified in section 147.277.1(b)(3)(L) and an explanation of why they were chosen;

2. Methods used to conduct data checks for each GHG emissions source, GHG sink, and GHG reservoir; and

3. A summary of the information analyzed in the data checks and document reviews conducted for each GHG emissions source, GHG sink, and GHG reservoir.

(I) The sampling plan list, prepared pursuant to section 147.277.1(b)(3)(H), must be updated and finalized prior to the completion of offset verification services. The final sampling plan must describe in detail how the GHG emissions sources, GHG sinks, and GHG reservoirs with identified risk, subject to data checks, were reviewed for accuracy.

(J) The offset verification team must revise the sampling plan to describe tasks completed or needed to be completed by the offset verification team as relevant information becomes available and potential issues emerge of offset material misstatement or nonconformance with the requirements of the Compliance Offset Protocol and this chapter.

(K) The verification body must retain the sampling plan in paper, electronic, or other format for a period of not less than 15 years following the submission of each Offset Verification Statement. The sampling plan must be made available at any time during offset verification services to DEP or the Offset Project Registry within 10 calendar days upon request. The verification body must also retain all material received, reviewed, or generated to render an Offset Verification Statement for an Offset Project Operator or Authorized Project Designee for 15 years following the submittal of each Offset Verification Statement. The documentation must allow for a transparent review of how a verification body reached its conclusion in the detailed verification report and Offset Verification Statement.

(L) Data Checks for Offset Project Data Reports. To determine the reliability of the submitted Offset Project Data Report, the offset verification team must use data checks. Such data checks must focus first on the largest and most uncertain estimates of project baseline GHG emissions, project emissions, GHG reductions, and GHG removal enhancements, and the offset verification team must:

1. Use data checks to ensure that the appropriate methodologies and GHG emission factors have been applied in calculating the project baseline and Reporting Period GHG emissions, project emissions, GHG reductions, and GHG removal enhancements calculations in the Compliance Offset Protocol;

2. Choose GHG emissions sources, project emissions, GHG sinks, and GHG reservoirs for data checks based on their relative sizes and risks of offset material misstatement or nonconformance as indicated in the sampling plan;
3. Use professional judgment in the number of data checks required for the offset verification team to conclude with reasonable assurance whether the Offset Project Operator's or Authorized Project Designee's total reported GHG reductions and GHG removal enhancements are free of offset material misstatement and the Offset Project Data Report otherwise conforms to the requirements of the Compliance Offset Protocol and this chapter. At a minimum a data check must include the following:
 - a. Tracing data in the Offset Project Data Report to its origin;
 - b. Looking at the process for data compilation and collection;
 - c. Reviewing all GHG inventory designs for GHG sources, GHG sinks, and GHG reservoirs, and sampling procedures, if applicable;
 - d. Recalculating baseline GHG emissions, project emissions, GHG reductions, and GHG removal enhancements estimates to check original calculations;
 - e. Reviewing calculation methodologies used by the Offset Project Operator or Authorized Project Designee for conformance with the Compliance Offset Protocol and this chapter;
 - f. Reviewing meter and fuel analytical instrumentation calibration, if applicable; and
 - g. Reviewing the quantification from models approved for use in the Compliance Offset Protocol, if applicable; and
4. Compare its own calculated results for the data checks conducted with the reported offset project data in order to confirm the extent and impact of any omissions and errors. Any discrepancies must be identified in the issues log. The comparison of data checks must also include a narrative to indicate which GHG emissions sources, GHG sinks, and GHG reservoirs were checked, the types and quantity of data that were evaluated for each GHG emissions source, GHG sink, and GHG reservoir, how the data checks were conducted including calculations, and any discrepancies that were identified.

(M) Offset Project Data Report Modifications. As a result of review by the offset verification team and prior to completion of an Offset Verification Statement, the Offset Project Operator or Authorized Project Designee must make any possible improvements and fix any correctable errors to the submitted Offset Project Data Report, and a revised Offset Project Data Report must be submitted to DEP or the Offset Project Registry. The revised Offset Project Data Report must include all components required in section 147.276(d). If the Offset Project Operator or Authorized Project Designee does not make all possible improvements and fix any correctable errors to the Offset Project Data Report, the verification body must issue an Adverse Offset Verification Statement. The offset verification team shall use professional judgment in the determination of correctable errors, including whether differences are not errors but result from truncation or rounding. The offset verification team must document in the issues log the source of any difference identified, including whether the difference results in a correctable error. Documentation for all Offset Project Data Report submittals must be retained by the Offset Project Operator or Authorized Project Designee for the length of time specified in section 147.276(e)(2).

(N) To verify that the Offset Project Data Report is free of offset material misstatement, the offset verification team must make its own determination of GHG reductions or GHG removal enhancements relative to the project baseline using the data check conducted pursuant to section 147.277.1(b)(3)(L), and must determine whether there is reasonable assurance that the Offset Project Data Report does not contain an offset material misstatement for the Offset Project Operator or Authorized Project Designee, on a CO₂e basis. To assess conformance with this chapter and the Compliance Offset Protocol the offset verification team must review the methods and factors used to develop the Offset Project Data Report for adherence to the requirements of this chapter and the Compliance Offset Protocol and ensure that other requirements of this chapter are met.

(O) Issues Log. The offset verification team must keep a log of any issues identified in the course of offset verification services that may affect determinations of offset material misstatement and nonconformance. The issues log must identify the section of this chapter or Compliance Offset Protocol related to the nonconformance, if applicable, and indicate whether the issues were corrected by the Offset Project Operator or Authorized Project Designee prior to completing the offset verification services. Any other concerns that the offset verification team

has with the preparation of the Offset Project Data Report must be documented in the issues log. The issues log must indicate whether the issues could have any bearing on offset material misstatement or conformance.

(P) An assessment of offset material misstatement is conducted for net GHG reductions and GHG removal enhancements achieved in a given Reporting Period relative to the project baseline in that Reporting Period in metric tons of CO₂e.

(Q) The offset verification team must determine whether the GHG reductions and GHG removal enhancements quantified and reported in the Offset Project Data Report contain an offset material misstatement using the following equation:

$$\text{Percent error} = \frac{[\sum \text{Discrepancies} + \sum \text{Omissions} + \sum \text{Misreporting}] \times 100\%}{\text{Total Reported Emission Reductions and Removal Enhancements}}$$

Where:

“Discrepancies” means any differences between the reported GHG value for sources, sinks, and reservoirs for the project baseline or project, and the verifier calculated GHG value for a data source subject to data checks in 147.277.1(b)(3)(L) calculated by the offset verification team. Any discrepancies identified must include the positive or negative impact of the GHG source, sink, or reservoir on the total reported GHG emission reductions and removal enhancements when input into the offset material misstatement equation.

“Omissions” means any GHG emissions or removal enhancements associated with required sources, sinks, and reservoirs for the project baseline or project emissions, that the offset verification team concludes must be part of the Offset Project Data Report, but were not included by the Offset Project Operator or Authorized Project Designee in the Offset Project Data Report. Any omissions found by the offset verification team must include the positive or negative impact of the omission on the total reported GHG emission reductions and removal enhancements when input into the offset material misstatement equation.

“Misreporting” means duplicative, incomplete, or other GHG emissions or removal enhancements for required sources, sinks, and reservoirs in the project baseline or project emissions, the offset verification team concludes should, or should not, be part of the Offset Project Data Report. Any misreporting found by the offset verification team must include the

positive or negative impact of the misreporting on the total reported GHG emission reductions and removal enhancements when input into the offset material misstatement equation.

“Total reported emission reductions and removal enhancements” means net GHG reductions and GHG removal enhancements reported by the Offset Project Operator or Authorized Project Designee for an Offset Project Data Report relative to the project baseline for that Offset Project Data Report in metric tons CO_{2e}.

(R) Offset verification services are not complete until DEP offset credits are issued for the GHG emission reductions and GHG removal enhancements reported in an Offset Project Data Report. Offset verification services must include:

1. Offset Verification Statement. Prior to completion of the offset verification services conducted pursuant to section 147.277.1(b)(3), the verification body must complete an Offset Verification Statement for each Offset Project Data Report for which offset verification services were conducted and provide it to the Offset Project Operator or Authorized Project Designee and DEP or the Offset Project Registry by the verification deadline pursuant to section 147.277(d). Before the Offset Verification Statement is completed, the verification body must have the offset verification services and findings of the offset verification team independently reviewed within the verification body by an independent reviewer not involved in offset verification services for that offset project. The independent reviewer may not be the offset project specific verifier, and may not accompany the offset verification team on a site visit. The independent reviewer may conduct a separate site visit, if necessary.

2. The independent reviewer shall serve as the final check of the offset verification team’s work to identify any significant concerns, including:

- a. Errors in planning;
- b. Errors in data sampling; and
- c. Errors in judgment by the offset verification team that are related to the draft offset verification statement.

3. The independent reviewer must maintain independence from the offset verification services by not making specific recommendations about how the offset verification services should be conducted. The independent reviewer will review documents applicable to the

offset verification services provided and identify any failure to comply with the requirements of this chapter or with the verification body's internal policies and procedures for providing offset verification services. The independent reviewer must concur with the offset verification findings before the Offset Verification Statement can be issued.

4. When the offset verification team completes its findings:

a. The verification body must provide to the Offset Project Operator or Authorized Project Designee a detailed verification report for each Offset Project Data Report for which offset verification services were conducted. The detailed verification report must at a minimum include the Offset Verification Plan, the detailed comparison of the data checks conducted during offset verification services pursuant to section 147.277.1(b)(3)(L), including the required narrative, the issues log identified in the course of offset verification activities and the issue resolutions, and any qualifying comments on findings during offset verification services. The detailed verification report must also include the calculations performed in 147.277.1(b)(3)(Q) with enough detail to understand the relationships between the data checks and the offset material misstatement evaluation, and be made available to DEP within 10 calendar days upon request. If the Offset Verification Statement is being submitted to an Offset Project Registry, then the verification body must submit the detailed verification report to the Offset Project Registry with the Offset Verification Statement. The detailed verification report must be submitted to the Offset Project Operator or Authorized Project Designee at the same time or before the Offset Verification Statement is submitted to DEP or the Offset Project Registry.

b. The verification body must provide the Offset Verification Statement to the Offset Project Operator or Authorized Project Designee and DEP or the Offset Project Registry, attesting to DEP whether the verification body has found the submitted Offset Project Data Report to be free of offset material misstatement, and whether the Offset Project Data Report is in conformance with the requirements of this chapter and the Compliance Offset Protocol.

c. A Compliance Offset Protocol may restrict the use of a Qualified Positive Offset Verification Statement for certain project types, in which case the verification body must submit either a Positive Offset Verification Statement or an Adverse Offset Verification Statement. In the case of a Qualified Positive Offset Verification Statement, when not restricted by a Compliance Offset Protocol, the verification body will qualify the Offset Verification Statement

to indicate any nonconformances allowed for a qualified Positive Offset Verification Statement as defined in section 147.002 contained within the Offset Project Data Report and that these nonconformances do not result in an offset material misstatement.

d. The offset verification team must have a final discussion with the Offset Project Operator or Authorized Project Designee explaining their findings and notifying the Offset Project Operator or Authorized Project Designee of any unresolved issues noted in the issues log before the Offset Verification Statement is finalized and submitted to the Offset Project Registry or DEP.

e. The lead verifier in the offset verification team must attest to DEP in the Offset Verification Statement that the offset verification team has carried out all offset verification services as required by this chapter, and the lead verifier who has conducted the independent review of offset verification services and findings must attest to his or her independent review on behalf of the verification body and his or her concurrence with the offset verification findings.

f. The lead verifier must attest in the Offset Verification Statement, in writing, to DEP as follows:

“I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that the offset verification team has carried out all offset verification services as required by sections 147.277.1, 147.277.2, and the applicable Compliance Offset Protocol and the findings are true, accurate, and complete and have been independently reviewed by an independent reviewer as required under sections 147.277.1(b)(3)(R)(1.) through 147.277.1(b)(3)(R)(3.).”

5. Prior to the verification body providing an Adverse Offset Verification Statement to DEP or the Offset Project Registry, the Offset Project Operator or Authorized Project Designee must be provided at least 10 working days to modify the Offset Project Data Report to correct any offset material misstatement or nonconformance found by the offset verification team. The modified Offset Project Data Report and Offset Verification Statement must be submitted to DEP or the Offset Project Registry by the applicable verification deadline, unless the Offset Project Operator or Authorized Project Designee makes a request to DEP pursuant to section 147.277.1(b)(3)(R)(6.).

6. If the Offset Project Operator or Authorized Project Designee and the verification body cannot reach agreement on modifications to the Offset Project Data Report that result in a Positive Offset or Qualified Positive Offset Verification Statement due to a disagreement on the requirements of this chapter or Compliance Offset Protocol, the Offset Project Operator or Authorized Project Designee may petition DEP to make a decision as to the verifiability of the submitted Offset Project Data Report.

7. If DEP determines that the Offset Project Data Report does not meet the standards and requirements specified in this chapter, the Offset Project Operator or Authorized Project Designee must provide any additional information within 30 calendar days of the DEP determination. DEP will review the new information and notify the Offset Project Operator or Authorized Project Designee and verification body of its final decision. In re-verifying a revised Offset Project Data Report, the verification body and offset verification team shall be subject to the requirements in sections 147.277.1(b)(3)(R)1. through 147.277.1(b)(3)(R)4. and must submit the revised Offset Verification Statement to DEP or the Offset Project Registry within 15 calendar days.

8. If DEP or the Offset Project Registry determines that the detailed verification report required pursuant to 147.277.1(b)(3)(R)4.a does not contain sufficient information to substantiate the attestations in the Offset Verification Statement, then the verification body must submit a revised verification report and a revised Offset Verification Statement to DEP or the Offset Project Registry within 15 calendar days of the determination.

(S) Upon submission of the Offset Verification Statement to DEP or the Offset Project Registry, the Offset Project Data Report must be considered final and no further changes may be made by the Offset Project Operator or Authorized Project Designee unless the Offset Project Registry or DEP requests any changes as part of their review. Once DEP offset credits are issued for the Offset Project Data Report, all offset verification requirements of this chapter shall be considered complete for the applicable Offset Project Data Report.

(T) If the Department finds a high level of conflict of interest existed between a verification body and an Offset Project Operator or Authorized Project Designee pursuant to section 147.279(b)(4) and section 147.279(b)(5), or an Offset Project Data Report that received a Positive Offset or Qualified Positive Offset Verification Statement fails an DEP audit, the

Secretary may set aside the Positive Offset or Qualified Positive Offset Verification Statement submitted by the verification body and require the Offset Project Operator or Authorized Project designee to have the Offset Project Data Report re-verified by a different verification body within 90 calendar days of this finding.

(U) Upon request by DEP or the Offset Project Registry, the Offset Project Operator or Authorized Project Designee must provide the data used to generate an Offset Project Data Report, including all data available to the offset verification team in the conduct of offset verification services, within 10 working days of the request.

(V) Upon request by DEP or the Offset Project Registry the verification body must provide DEP or the Offset Project Registry the detailed verification report given to the Offset Project Operator or Authorized Project Designee, as well as the sampling plan, contracts for offset verification services, and any other supporting documentation. All documentation must be provided by the verification body to DEP or the Offset Project Registry within 10 working days of the request.

(W) Upon written notification by DEP the verification body and its staff must be available for an offset verification services audit when providing offset verification services for an offset project listed with DEP or an Offset Project Registry using a Compliance Offset Protocol.

§ 147.277.2. Additional Project Specific Requirements for Offset Verification Services.

In addition to meeting the offset verification requirements in sections 147.277 and 147.277.1, Offset Project Operators or Authorized Project Designees must ensure the GHG emission reductions and GHG removal enhancements resulting from an offset project meet any additional verification requirements in the Compliance Offset Protocol, if applicable, for an offset project of that type.

§ 147.278. Offset Verifier and Verification Body Accreditation.

(a) An offset verifier or verification body must meet the accreditation requirements of the MRR to provide offset verification services to verify GHG emission reductions and GHG removal enhancements for offset projects listed pursuant to this chapter. Accreditation of verification bodies and offset verifiers for verifying Offset Project Data Reports under this

chapter must be achieved separately from accreditation for verifying reports submitted under the MRR.

(b) For purposes of this chapter, the subcontractor requirements of the MRR must be applied to the Offset Project Operator and/or Authorized Project Designee and not a reporting entity.

(c) A DEP accredited verification body must make itself and its personnel available for a DEP audit.

(d) A DEP-accredited offset verification body may employ or contract with technical experts not accredited by DEP to assist with offset verification services.

(1) All technical experts must be listed on the Notice of Offset Verification Services as required in section 147.277.1(b) and must be included in the evaluation for conflict of interest as required in section 147.279.

(2) Technical experts must be under the direct supervision of a DEP-accredited offset verifier while performing verification activities.

(3) Technical experts may assist in underlying offset verification tasks but may not be responsible for completing any offset verification services as defined in 147.002(a).

(e) “Direct supervision,” for purposes of this section, means daily, on-site, close contact with an DEP-accredited verifier acting as a supervisor to a technical expert during a site visit, who is able to respond to the needs of the technical expert. During a site visit, the supervisor must be physically present, or within 4 hours travel time and available to respond to the needs of the technical expert.

(f) “Technical expert,” for purposes of this section, means a person, who is not an DEP-accredited verifier, and has demonstrated expertise in a particular technical area for which the person hired by the verification body to assist with underlying offset verification task(s) that require a particular expertise. A technical expert may be an employee of the verification body working to get the required experience to become an DEP-accredited verifier.

§ 147.279. Conflict of Interest Requirements for Verification Bodies and Offset Verifiers for Verification of Offset Project Data Reports.

(a) The conflict of interest provisions of this section shall apply to verification bodies, lead verifiers, and offset verifiers accredited by DEP to perform offset verification services for Offset Project Operators, and Authorized Project Designees, if applicable, as well as any other member of the offset verification team and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee, if applicable.

(b) “Member” for the purposes of this section means any employee or subcontractor of the verification body or related entities of the verification body. “Member” also includes any individual with majority equity share in the verification body or its related entities. “Related entity” for the purposes of this section means any direct parent company, direct subsidiary, or sister company. The potential for a conflict of interest must be deemed to be high where:

(1) The verification body and Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) share any senior management staff or board of directors membership, or any of the senior management staff of the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) have been employed by the verification body, or vice versa, within the previous three years; or

(2) Within the previous five years, any staff member of the verification body or any related entity or any member of the offset verification team has provided to the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) any of the following non-offset verification services:

(A) Designing, developing, implementing, reviewing, or maintaining an inventory or offset project information or data management system for air emissions, unless the review was part of providing GHG offset verification services;

(B) Developing GHG emission factors or other GHG-related engineering analysis;

(C) Designing energy efficiency, renewable power, or other projects which explicitly identify GHG reductions and GHG removal enhancements as a benefit;

(D) Designing, developing, implementing, internally auditing, consulting, or maintaining an offset project resulting in GHG emission reductions and GHG removal enhancements;

(E) Owning, buying, selling, trading, or retiring shares, stocks, or DEP offset credits or registry offset credits from the offset project;

(F) Dealing in or being a promoter of DEP offset credits or registry offset credits on behalf of an Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s);

(G) Preparing or producing GHG-related manuals, handbooks, or procedures specifically for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s);

(H) Appraisal services of carbon or GHG liabilities or assets;

(I) Brokering in, advising on, or assisting in any way in carbon or GHG-related markets;

(J) Directly managing any health, environment or safety functions for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s);

(K) Bookkeeping or other services related to the accounting records or financial statements;

(L) Any service related to information systems, including International Organization for Standardization 14001 Certification for Environmental Management (ISO 14001 Certification), unless those systems will not be reviewed as part of the offset verification process;

(M) Appraisal and valuation services, both tangible and intangible;

(N) Fairness opinions and contribution-in-kind reports in which the verification body has provided its opinion on the adequacy of consideration in a transaction, unless the information reviewed in formulating the Offset Verification Statement will not be reviewed as part of the offset verification services;

(O) Any actuarially oriented advisory service involving the determination of amounts recorded in financial statements and related accounts;

(P) Any internal audit service that has been outsourced by the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) that relates to the Offset Project Operator's, Authorized Project Designee's, if applicable, and their technical consultant(s) internal accounting controls, financial systems, or financial statements, unless the systems and data reviewed during those services, as well as the result of those services will not be part of the offset verification process;

(Q) Acting as a broker-dealer (registered or unregistered), promoter, or underwriter on behalf of the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s);

(R) Any legal or expert services to the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) or a legal representative for the purpose of a financing involving the Offset Project or advocating the Offset Project Operator's, Authorized Project Designee's, if applicable, and their technical consultant(s) interests in litigation or in a regulatory or administrative proceeding or investigation, unless providing factual testimony.

(3) Within the previous three years, any staff member of the verification body or any related entity or any member of the offset verification team has provided to the ozone depleting substances destruction facility a third-party certification of a facility to meet the requirements set forth by the United Nations Environment Programme Ozone Secretariat's Technology and Assessment Panel (TEAP) for ozone depleting substances destruction.

(4) The potential for conflict of interest will be deemed to be high when any member of the verification body provides any type of incentive to an Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) to secure an offset verification services contract.

(5) The potential for a conflict of interest will also be deemed to be high where any member of the verification body has provided offset verification services for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) except within the time periods in which the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) is allowed to use the same verification body as specified in section 147.277.1(a).

(c) The potential for a conflict of interest must be deemed to be low where no potential for a conflict of interest is found under section 147.279(b) and any non-offset verification services provided by any member of the verification body to the Offset Project Operator, Authorized Project Designee, if applicable, and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee within the last five years are valued at less than 20 percent of the fee for the proposed offset verification, except where medium conflict of interest related to personal, employment, or family relationships is identified pursuant to section 147.279(d).

(d) The potential for a conflict of interest must be deemed to be medium where the potential for a conflict of interest is not deemed to be either high or low as specified in sections 147.279(b) and 147.279(c), or where there are any instances of personal, employment, or familial relationships between the verification body and management or employees of the Offset Project Operator or Authorized Project Designee, if applicable, and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee and when a conflict of interest self-evaluation is submitted pursuant to section 147.279(g). For purposes of section 147.279 only, “employment” means the condition of having paid work documented in a W-2 form. If a verification body identifies a medium potential for conflict of interest and intends to provide offset verification services for the Offset Project Operator, Authorized Project Designee, if applicable, and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee for an offset project listed with DEP or an Offset Project Registry, the verification body must submit, in addition to the submittal requirements specified in section 147.279(e), a plan to avoid, neutralize, or mitigate the potential conflict of interest situation. At a minimum, the conflict of interest mitigation plan must include:

(1) A demonstration that any members with potential conflicts have been removed and insulated from the project;

(2) An explanation of any changes to the organizational structure or verification body to remove the potential conflict of interest. A demonstration that any unit with potential conflicts has been divested or moved into an independent entity or any subcontractor with potential conflicts has been removed; and

(3) Any other circumstance that specifically addresses other sources for potential conflict of interest.

(e) Conflict of Interest Submittal Requirements for Accredited Verification Bodies. Before providing any offset verification services, the verification body must submit to the Offset Project Operator, and Authorized Project Designee, if applicable, DEP and the Offset Project Registry, a self-evaluation of the potential for any conflict of interest that the verification body, its staff, its related entities, or any subcontractors performing offset verification services may have with the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) for which it will perform offset verification services. Offset verification services shall not commence prior to approval of the conflict of interest self-evaluation by DEP or the Offset Project Registry pursuant to section 147.279(f). The submittal must include the following:

(1) Identification of whether the potential for conflict of interest is high, low, or medium based on factors specified in sections 147.279(b), (c), and (d);

(2) Identification of whether any member of the offset verification team has previously provided offset verification services for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s), and, if so, the years in which such offset verification services were provided; and

(3) Identification of whether any member of the offset verification team or related entity has engaged in any non-offset verification services of any nature with the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) either within or outside Pennsylvania during the previous five years. If non-offset verification services have previously been provided, the following information must also be submitted:

(A) Identification of the nature and location of the work performed for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) and whether the work is similar to the type of work to be performed during offset verification;

(B) The nature of past, present, or future relationships with the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s), including:

1. Instances when any member of the offset verification team has performed or intends to perform work for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s);

2. Identification of whether work is currently being performed for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s), and if so, the nature of the work;

3. How much work was performed for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) in the last five years, in dollars;

4. Whether any member of the offset verification team has any contracts or other arrangements to perform work for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) or a related entity; and

5. How much work related to GHG reductions and GHG removal enhancements the offset verification team has performed for the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) or related entities in the last five years, in dollars;

(C) Explanation of how the amount and nature of work previously performed is such that any member of the offset verification team's credibility and lack of bias should not be under question;

(D) A list of names of the staff that would perform offset verification services for the Offset Project Operator, and Authorized Project Designee, if applicable, and a description of any instances of personal, employment, or family relationships with management or employees of the Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) that potentially represent a conflict of interest;

(E) Identification of any other circumstances known to the verification body, or Offset Project Operator, Authorized Project Designee, if applicable, and their technical consultant(s) that could result in a conflict of interest; and

(F) Attest, in writing, to DEP as follows:

"I certify under penalty of perjury of the laws of the Commonwealth of Pennsylvania the information provided in the Conflict of Interest submittal is true, accurate, and complete."

(f) Approval of Conflict of Interest Submittals. DEP or the Offset Project Registry must review the self-evaluation submitted by the verification body and determine whether the verification body is authorized to perform the offset verification services for the Offset Project Operator and Authorized Project Designee, if applicable.

(1) DEP or the Offset Project Registry has 30 calendar days to make a determination whether to accept or deny the conflict of interest submittal and notify the verification body whether it may proceed with the offset verification services for the Offset Project Operator and Authorized Project Designee, if applicable.

(A) If DEP or an Offset Project Registry requests revisions to the conflict of interest self-evaluation prior to approval, the verification body must resubmit the revised conflict of interest self-evaluation within 10 working days of such request, or if there is a reason the verification body cannot submit the revisions within 10 working days, the verification body must communicate to DEP and the Offset Project Registry, in writing, as to the reasons why and get approval from DEP or the Offset Project Registry for an extension.

(B) If DEP or the Offset Project Registry determines that the verification body or any member of the offset verification team meets the criteria in section 147.279(b), DEP or the Offset Project Registry shall find a high potential conflict of interest and offset verification services may not proceed.

(C) If DEP or the Offset Project Registry determines that there is a low potential conflict of interest, offset verification services may proceed.

(D) If DEP or the Offset Project Registry determines that the verification body or any member of the offset verification team have a medium potential for conflict of interest, DEP or the Offset Project Registry shall evaluate the conflict of interest mitigation plan submitted by the verification body pursuant to section 147.279(d) and may request additional information from the applicant to complete the determination. In determining whether offset verification services may proceed, DEP or the Offset Project Registry may consider factors including, but not limited to, the nature of previous work performed, the current and past relationships between the verification body, related entities, and its subcontractors with the Offset Project Operator and Authorized Project Designee, if applicable, and any technical consultant(s) used by the Offset Project Operator or Authorized Project Designee, and related entities, and the cost of the offset

verification services to be performed. If DEP or the Offset Project Registry determines that these factors when considered in combination demonstrate an acceptable level of potential conflict of interest, DEP or the Offset Project Registry will authorize the verification body to provide offset verification services.

(2) If the offset project was listed with an Offset Project Registry, the conflict of interest self-evaluation acceptance or denial notification will be given by the Offset Project Registry.

(g) Monitoring Conflict of Interest Situations.

(1) After commencement of offset verification services, the verification body must monitor and immediately make full disclosure, in writing, to DEP and the Offset Project Registry regarding any potential for a conflict of interest situation that arises for an offset project using a Compliance Offset Protocol. This disclosure must include a description of actions that the verification body has taken or proposes to take to avoid, neutralize, or mitigate the potential for a conflict of interest.

(2) The verification body must continue to monitor arrangements or relationships that may be present for a period of one year after the completion of offset verification services for an offset project using a Compliance Offset Protocol. During that period, within 30 days of the verification body or any verification team member entering into any contract with the Offset Project Operator, and Authorized Project Designee, if applicable, for which the verification body has provided offset verification services, the verification body must notify DEP and the Offset Project Registry of the contract and the nature of the work to be performed. DEP or the Offset Project Registry, within 30 working days, will determine the level of conflict using the criteria in sections 147.279(a) through (d), if the Offset Project Operator, and Authorized Project Designee, if applicable, must re-verify their Offset Project Data Report, and if accreditation revocation is warranted by DEP.

(3) The verification body must notify DEP and the Offset Project Registry within 30 calendar days, of any emerging conflicts of interest during the time offset verification services are being provided for an offset project using a Compliance Offset Protocol.

(A) If DEP or the Offset Project Registry determines that an emerging potential conflict disclosed by the verification body is medium risk, and this risk can be mitigated, then the verification body meets the conflict of interest requirements to continue to provide offset verification services for the Offset Project Operator, and Authorized Project Designee, if applicable, and will not be subject to suspension or revocation of accreditation as specified in section 95132(d) of MRR.

(B) If DEP or the Offset Project Registry determines that an emerging potential conflict disclosed by the verification body is medium or high risk, and this risk cannot be mitigated, then the verification body will not be able to continue to provide offset verification services for the Offset Project Operator, and Authorized Project Designee, if applicable, and may be subject to the suspension or revocation of accreditation by DEP under section 95132(d) of MRR.

(4) The verification body must report to DEP and the Offset Project Registry, if applicable, any changes in its organizational structure, including mergers, acquisitions, or divestitures, for one year after completion of offset verification services.

(5) DEP may void a Positive Offset or Qualified Positive Offset Verification Statement received in section 147.281 if it discovers a potential conflict of interest has arisen for any member of the offset verification team. In such a case, the Offset Project Operator, and Authorized Project Designee, if applicable, shall be provided 90 calendar days to complete re-verification.

(6) If the verification body or its subcontractor(s) are found to have violated the conflict of interest requirements of this chapter, the Secretary may rescind accreditation of the body, its verifier staff, or its subcontractor(s) for any appropriate period of time as provided in section 95132(d) of MRR.

(h) Specific Requirements for Jurisdictions with Approved Air Pollution Control Programs.

(1) If a jurisdiction with an approved air pollution control program has provided or is providing any services listed in section 147.279(b)(2) as part of its regulatory duties, those

services do not constitute non-verification services or a potential for high conflict of interest for purposes of this chapter;

(2) Before providing offset verification services, a jurisdiction with an approved air pollution control program must submit a conflict of interest self-evaluation pursuant to 147.279(e) for each Offset Project Operator, and Authorized Project Designee, if applicable, for which it intends to provide offset verification services. As part of its conflict of interest self-evaluation submittal under section 147.279(e), the jurisdiction with an approved air pollution control program shall certify that it will prevent conflicts of interests and resolve potential conflict of interest situations pursuant to its policies and mechanisms submitted under section 95132(b)(1)(G) of MRR;

(3) If a jurisdiction with an approved air pollution control program hires a subcontractor who is not an employee to provide offset verification services, the air district shall be subject to all of the requirements of section 147.279.

§ 147.279.1 Additional Requirements for Jurisdictions with Approved Air Pollution Control Programs.

(a) The following requirements will apply to municipalities with approved air pollution programs that meet the requirements under section 147.278 to become accredited as an offset verification body and/or the requirements under section 147.286 to meet the requirements as an approved Offset Project Registry:

(1) The jurisdiction may:

(A) Register with DEP pursuant to section 147.130; and

(B) Hold compliance instruments as a voluntarily associated entity pursuant to section 147.114.

(2) The jurisdiction may not:

(A) Be an Offset Project Operator or Authorized Project Designee for any offset project for which it provides offset verification services pursuant to sections 147.277, 147.277.1, and 147.277.2, and for which the air district will subsequently request the issuance of DEP offset credits pursuant to section 147.281;

(B) Be an Offset Project Operator or Authorized Project Designee for any offset project for which it provides registry services pursuant to section 147.287, and for which the air district will subsequently request the issuance of DEP offset credits pursuant to section 147.281; and

(C) Be an offset verification body for any offset project developed using a Compliance Offset Protocol for which it would provide registry services pursuant to section 147.287.

§ 147.280. Issuance of Registry Offset Credits.

(a) One registry offset credit, which represents one metric ton of CO₂e for a direct GHG emission reduction or direct GHG removal enhancement, will be issued pursuant to section 147.280.1 only if:

(1) An Offset Project Registry has listed the offset project pursuant to section 147.275;

(2) The GHG emission reductions or GHG removal enhancements were issued a Positive Offset or Qualified Positive Offset Verification Statement pursuant to section 147.277.1 and 147.277.2; and

(3) An Offset Project Registry has received a Positive Offset or Qualified Positive Offset Verification Statement issued and attested to by a DEP-accredited verification body for the Offset Project Data Report for which registry offset credits would be issued.

(b) An Offset Project Registry will determine whether the GHG emission reductions and GHG removal enhancements meet the requirements of section 147.280(a), the information submitted pursuant to section 147.280(a) is complete, and the Positive Offset or Qualified Positive Offset Verification Statement meets the requirements of sections 147.277, 147.277.1, and 147.277.2 within 45 calendar days of receiving it.

(c) Determination for Timing and Duration of Initial Crediting Periods for Offset Projects Submitted Through an Offset Project Registry. The initial crediting period will begin with the date that the first verified GHG emission reductions and GHG removal enhancements occur, according to the first Positive Offset or Qualified Positive Offset Verification Statement

that is received by an Offset Project Registry, unless otherwise specified in the applicable Compliance Offset Protocol.

(d) Determination for Timing and Duration of Renewed Crediting for Offset Projects Submitted through an Offset Project Registry. A renewed crediting period will begin the day after the conclusion of the prior crediting period.

§ 147.280.1 Process for Issuance of Registry Offset Credits.

(a) An Offset Project Registry may issue a registry offset credit that meets the requirements of sections 147.280(a) and (b) to an Offset Project Operator, Authorized Project Designee, or any other third party authorized by the Offset Project Operator or Authorized Project Designee to receive registry offset credits, no later than 15 calendar days after an Offset Project Registry makes a determination pursuant to section 147.280(b).

(b) Change of Listing Status at the Offset Project Registry. When an Offset Project Registry issues a registry offset credit for an offset project, the listing status for that offset project will be changed to either “Active Registry Project” or “Active Registry Renewal” at the Offset Project Registry and DEP.

(c) Notice of Determination of Issuance of Registry Offset Credits. Not later than 15 calendar days after an Offset Project Registry issues a registry offset credit, an Offset Project Registry will notify the Offset Project Operator, Authorized Project Designee, or any other third party authorized by the Offset Project Operator of the issuance.

(d) Requests for Additional Information. An Offset Project Registry may request additional information for offset projects seeking issuance of registry offset credits from the Offset Project Operator, Authorized Project Designee or verification body.

(1) An Offset Project Registry may request any additional information from the Offset Project Operator, Authorized Project Designee, if applicable, or the verification body within the timeframe specified in section 147.280(b) before issuing registry offset credits for an offset project that meets the requirements of sections 147.280(a) and (b).

(2) If an Offset Project Registry determines the information submitted pursuant to sections 147.280(a), 147.280(b), and 147.280.1(d)(2) does not meet the requirements for issuance of registry offset credits, an Offset Project Registry must deny issuance of registry

offset credits. The Offset Project Operator or Authorized Project Designee may petition an Offset Project Registry within 10 days of denial for a review of the information submitted pursuant to sections 147.280(a), 147.280(b), and 147.280.1(d)(2) and respond to any issues that prevent the issuance of registry offset credits.

(3) An Offset Project Registry must make a final determination within 30 calendar days of receiving the Offset Project Operator's or Authorized Project Designee's request in section 147.280.1(d)(2) and may request additional information from the Offset Project Operator, Authorized Project Designee, if applicable, or verification body.

(4) If an Offset Project Registry determines not to issue registry offset credits, the Offset Project Registry must submit a detailed report to DEP that describes why they came to a negative determination.

(5) If an Offset Project Registry determines not to issue registry offset credits, the Offset Project Operator or Authorized Project Designee may request that DEP make a final determination on whether the GHG reductions or removal enhancements achieved by the offset project meet the requirements for registry offset credit issuance. In making this determination, DEP may consult with the Offset Project Operator, Authorized Project Designee, if applicable, verification body, and Offset Project Registry before making the final determination.

(6) If after reviewing all the information, DEP determines that the GHG reductions or removal enhancements meet the requirements for registry offset credit issuance, the Offset Project Registry will issue registry offset credits in the amount of GHG reductions or removal enhancements verified to have been achieved by the offset project for the applicable Reporting Period(s).

(e) At the time of issuance or after notifying the Offset Project Operator, Authorized Project Designee, or any other third party authorized by the Offset Project Operator to receive registry offset credits, of the issuance, the Offset Project Registry will create a unique serial number for each registry offset credit.

§ 147.281. Issuance of DEP Offset Credits.

(a) One DEP offset credit, which represents one metric ton of CO₂e for a direct GHG emission reduction or direct GHG removal enhancement, will be issued only for a GHG

emission reduction or GHG removal enhancement that occurs during a Reporting Period. One DEP offset credit will be issued for each metric ton of CO₂e only if:

(1) DEP or an Offset Project Registry has listed the offset project pursuant to section 147.275;

(2) The GHG emission reductions and GHG removal enhancements were issued a Positive Offset or Qualified Positive Offset Verification Statement pursuant to sections 147.277.1 and 147.277.2;

(3) DEP or an Offset Project Registry has received a Positive Offset or Qualified Positive Offset Verification Statement issued and attested to by an DEP-accredited verification body for the Offset Project Data Report for which registry offset credits were issued pursuant to section 147.280.1, if the offset project was submitted for listing with an Offset Project Registry, or for which DEP offset credits would be issued pursuant to section 147.281.1; and

(4) The issued DEP offset credits would not immediately be subject to invalidation pursuant to sections 147.285(c)(1) and 147.285(c)(3).

(b) Requirements for Offset Projects Submitted Through an Offset Project Registry Seeking Issuance of DEP Offset Credits. If an Offset Project Operator or Authorized Project Designee provides information for listing pursuant to section 147.275, monitors and reports pursuant to section 147.276, and has their offset project verified pursuant to sections 147.277, 147.277.1, and 147.277.2 through an Offset Project Registry, the Offset Project Operator or Authorized Project Designee must provide the following information to DEP for issuance of DEP offset credits pursuant to section 147.281.1:

(1) The attestations required in sections 147.275(c)(1), 147.275(c)(2), 147.275(c)(3), 147.276(d)(7), 147.277.1(b)(3)(R)(4)b, 147.277.1(b)(3)(R)(4)e., 147.277.1(b)(3)(R)(4)f, and any in the applicable Compliance Offset Protocol;

(2) Offset project listing information submitted to an Offset Project Registry pursuant to sections 147.275(c) and (e);

(3) The original and final Offset Project Data Reports submitted to an Offset Project Registry pursuant to sections 147.276(d), 147.277.1(b)(3)(M), and 147.277.1(b)(3)(R)5; and

(4) Offset Verification Statements submitted pursuant to section 147.277.1(b)(3)(R)(4)b.

(5) The Offset Project Operator, or Authorized Project Designee, if applicable, must submit a request for issuance of DEP offset credits to DEP for each Offset Project Data Report for which they are seeking issuance of DEP offset credits identifying which Holding Accounts the DEP offset credits should be placed into and how many DEP offset credits will be placed into each Holding Account. The Offset Project Operator or Authorized Project Designee may request that DEP offset credits are placed into the Holding Account of any party not prohibited to hold compliance instruments under this Chapter. Any party receiving DEP offset credits at the time of DEP offset credit issuance must have a tracking system account with DEP.

(A) An Offset Project Operator or Authorized Project Designee may request that only a portion of the eligible GHG reductions and removal enhancements for the applicable Reporting Period be issued DEP offset credits in the request for issuance.

(B) The request for issuance of DEP offset credits may be provided to DEP when the Offset Project Operator or Authorized Project Designee, if applicable, submits the information in sections 147.281(b)(1) through (4) but must be provided to DEP before it will issue DEP offset credits pursuant to section 147.281.1. If the offset project was listed by an Offset Project Registry, the request for issuance of DEP offset credits may not be provided to DEP until the Offset Project Registry has issued registry offset credits for the applicable Offset Project Data Report(s).

(c) DEP will determine whether the GHG emission reductions and GHG removal enhancements meet the requirements of this chapter and the applicable Compliance Offset Protocol, the information submitted in sections 147.281(b) and (c) is complete, and the Positive Offset or Qualified Positive Offset Verification Statement meets the requirements of sections 147.277, 147.277.1, and 147.277.2 within 45 calendar days of receiving complete and accurate information.

(d) Before DEP issues a DEP offset credit pursuant to section 147.281.1 for GHG reductions and GHG removal enhancements achieved by an offset project in a Reporting Period, the Offset Project Operator or Authorized Project Designee must provide the following attestations, in writing, to DEP:

(1) “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania the GHG reductions or GHG removal enhancements for [project] from [date] to [date] have been measured in accordance with the [appropriate DEP Compliance Offset Protocol] and all information required to be submitted to DEP is true, accurate, and complete.”;

(2) “I understand I am voluntarily participating in the Pennsylvania Greenhouse Gas Cap-and-Trade Program under 25 Pa. Code Chapter 147, and by doing so, I am now subject to all regulatory requirements and enforcement mechanisms of this program and subject myself to the jurisdiction of Pennsylvania as the exclusive venue to resolve any and all disputes arising from the enforcement of provisions in this chapter.”;

(3) “I understand that the offset project activity and implementation of the offset project must be in accordance with all applicable local, regional, and national environmental and health and safety regulations that apply based on the offset project location. I understand that offset projects are not eligible to receive DEP or registry offset credits for GHG reductions and GHG removal enhancements that are not in compliance with the requirements of this chapter.”;

(4) “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania all information provided to DEP for issuance of DEP offset credits is true, accurate, and complete.”; and

(5) “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania that the GHG reductions and GHG removal enhancements for which I am seeking DEP Offset Credits have not been issued any offset credits or been used for any GHG mitigation requirements in any other voluntary or mandatory program, except, if applicable, an Offset Project Registry pursuant to section 147.280.1.”

(e) Determination for Timing and Duration of Initial Crediting Periods for Offset Projects Submitted Through DEP. The initial crediting period will begin with the date that the first verified GHG emission reductions and GHG removal enhancements occur, according to the first Positive Offset or Qualified Positive Offset Verification Statement that is received by DEP, unless otherwise specified in a Compliance Offset Protocol.

(f) Determination for Timing and Duration of Renewed Crediting for Offset Projects Submitted Through DEP. A renewed crediting period will begin the day after the conclusion of the prior crediting period.

§ 147.281.1 Process for Issuance of DEP Offset Credits.

(a) DEP will issue an DEP offset credit for GHG reductions and removal enhancements achieved in a Reporting Period for an offset project that meets the requirements of sections 147.281(a) and (b) to the DEP Issuance Account no later than 15 calendar days after DEP makes a determination pursuant to section 147.281(c), as long as all attestations required in section 147.281(d) have been received by DEP prior to its determination.

(b) Change of Listing Status at DEP. When DEP issues a DEP offset credit for an offset project, the listing status for that offset project will be changed from “Active Registry Project” to “Active DEP Project” or “Active Registry Renewal” to “Active DEP Renewal” at the Offset Project Registry and DEP.

(c) Notice of Determination of Issuance of DEP Offset Credits. Not later than 15 calendar days after DEP determines to issue a DEP offset credit pursuant to section 147.281(c), DEP will notify the Offset Project Operator, Authorized Project Designee, or any other third party requested by the Offset Project Operator pursuant to section 147.281(b)(5)(B) to receive DEP offset credits, of its intent to issue DEP offset credits.

(d) Requests for Additional Information. DEP may request additional information for offset projects submitted through an Offset Project Registry seeking issuance of DEP offset credits.

(1) DEP will notify the Offset Project Operator, Authorized Project Designee, or other third party identified in section 147.281(b)(5)(B) within 15 calendar days of its determination pursuant to section 147.281(c) if the information submitted pursuant to section 147.281(b), (c), and (d) is incomplete and request additional specific information.

(2) DEP may request any additional information from the Offset Project Operator, Authorized Project Designee, Offset Project Registry, or verification body before issuing DEP offset credits for an offset project that meets the requirements of section 147.281. The Offset

Project Operator, Authorized Project Designee, Offset Project Registry, or verification body must submit the requested information to DEP within 10 calendar days of DEP's request.

(3) If DEP determines the information submitted in sections 147.281(b), 147.281(c), and 147.281.1(d)(2) does not meet the requirements for issuance of DEP offset credits, then DEP may deny issuance of DEP offset credits. The Offset Project Operator or Authorized Project Designee may petition DEP within 10 days of denial for a review of submitted information in sections 147.281(b), 147.281(c), and 147.281.1(d)(2) and respond to any issues that prevent the issuance of DEP offset credits.

(4) DEP must make a final determination within 30 calendar days of receiving the request in section 147.281.1(d)(3) and may request additional information from the Offset Project Operator or Authorized Project Designee, verification body, or Offset Project Registry. This determination made by the Secretary is final.

(e) A registry offset credit issued pursuant to section 147.280.1(a) must be removed or cancelled by the Offset Project Registry within 10 calendar days after DEP issues a DEP offset credit pursuant to this section, such that the registry offset credit is no longer available for transaction on the Offset Project Registry system. The Offset Project Registry must provide proof to DEP that the registry offset credits have been permanently removed or cancelled from the registry system.

(f) Receipt of DEP Offset Credits. DEP will transfer DEP offset credits into the Holding Account of the Offset Project Operator, Authorized Project Designee, or any other third party requested by the Offset Project Operator pursuant to section 147.281(b)(5)(B) to receive DEP offset credits, within 15 working days of the notice of determination pursuant to sections 147.281.1(c) and (d)(4).

§ 147.282. Registration of DEP Offset Credits.

A DEP offset credit will be registered by:

- (a) Creating a unique DEP serial number; and
- (b) Transferring the DEP offset credits to the Holding Account of the listed Offset Project Operator, Authorized Project Designee, or another third party as requested by the Offset

Project Operator pursuant to section 147.281(b)(5)(B) to receive DEP offset credits, unless otherwise required by section 147.283.

§ 147.283. Forestry Offset Reversals.

(a) For forest sequestration projects, a portion of DEP offset credits issued to the forest offset project will be placed by DEP into the Forest Buffer Account.

(1) The amount of DEP offset credits that must be placed in the Forest Buffer Account shall be determined as set forth in the applicable version of the Compliance Offset Protocol in section 147.273(a)(2)(C)4.

(2) DEP offset credits will be transferred to the Forest Buffer Account by DEP at the time of DEP offset credit registration pursuant to section 147.282.

(3) If a forest offset project is originally submitted through an Offset Project Registry an equal number of registry offset credits must be removed or cancelled by the Offset Project Registry, such that the registry offset credit is no longer available for transaction on the Offset Project Registry system, and issued by DEP for placement in the Forest Buffer Account.

(4) The DEP offset credits placed into the Forest Buffer Account must correspond to the Reporting Period for which the DEP offset credits are issued.

(b) Unintentional Reversals. If there has been an unintentional reversal, the Offset Project Operator or Authorized Project Designee must notify DEP and the Offset Project Registry, in writing, of the reversal and provide an explanation for the nature of the unintentional reversal within 30 calendar days of its discovery.

(1) In the case of an unintentional reversal the Offset Project Operator or Authorized Project Designee shall provide in writing to DEP and an Offset Project Registry, if applicable, a completed verified estimate of current carbon stocks within the offset project boundary within 23 months of the discovery of the unintentional reversal. To determine the verified estimate of current carbon stocks a full offset verification must be conducted pursuant to sections 147.277 through 147.278, including a site visit. The verified estimate may be submitted as a separate offset verification services or incorporated into a chapter of the detailed verification report submitted pursuant to section 147.277.1 when offset verification services are conducted for an Offset Project Data Report. After an unintentional reversal, the Offset Project Operator or

Authorized Project Designee does not need to submit an Offset Project Data Report until the required verified estimate of current carbon stocks within the offset project boundary is completed.

(2) If DEP determines that there has been an unintentional reversal, and DEP offset credits have been issued to the offset project, DEP will retire a quantity of DEP offset credits from the Forest Buffer Account in the amount of metric tons CO_{2e} reversed for all Reporting Periods.

(c) Intentional Reversals. Requirements for intentional reversals are as follows:

(1) If an intentional reversal occurs, the Offset Project Operator or Authorized Project Designee shall, within 30 calendar days of the intentional reversal:

(A) Give notice, in writing, to DEP and the Offset Project Registry, if applicable, of the intentional reversal; and

(B) Provide a written description and explanation of the intentional reversal to DEP and the Offset Project Registry, if applicable.

(2) Within one year of the occurrence of an intentional reversal, the Offset Project Operator or Authorized Project Designee shall submit to DEP and the Offset Project Registry, if applicable, a completed verified estimate of current carbon stocks within the offset project boundary. To determine the verified estimate of current carbon stocks a full offset verification must be conducted pursuant to sections 147.277 through 147.278, including a site visit. The verified estimate may be submitted as a separate offset verification services or incorporated into a chapter of the detailed verification report submitted pursuant to section 147.277.1 when offset verification services are conducted for an Offset Project Data Report.

(3) If an intentional reversal occurs from a forest offset project, and DEP offset credits have been issued to the offset project, the current or most recent (in the case of an offset project after the final crediting period), forest owner(s) must submit to DEP for placement in the Retirement Account a quantity of valid DEP offset credits or other approved compliance instruments pursuant to subchapter 4 within six months of notification by DEP in the amount determined pursuant to sections 147.283(c)(3):

(A) The forest owner must turn in valid compliance instruments in the amount of metric tons CO₂e reversed for all Reporting Periods.

(B) Notification by DEP will occur after the verified estimate of carbon stocks referred to in section 147.283(c)(2) has been submitted to DEP, or after one year has elapsed since the occurrence of the reversal if the Offset Project Operator or Authorized Project Designee fails to submit the verified estimate of carbon stocks.

(D) If the forest owner does not submit valid DEP offset credits or other approved compliance instruments in the amount required pursuant to sections 147.283(c)(3)(A) to DEP within six months of notification by DEP, DEP will retire a quantity of DEP offset credits equal to the difference between the number of metric tons of CO₂e determined pursuant to sections 147.283(c)(3)(A) and the number of retired approved compliance instruments from the Forest Buffer Account and the forest owner will be subject to enforcement action and each DEP offset credit retired from the Forest Buffer Account will constitute a separate violation pursuant to section 147.314.

(4) Early Project Terminations. If a project termination, as defined in the Compliance Offset Protocol in section 147.273(a)(2)(C)(4), occurs from a compliance or early action forest offset project, and DEP offset credits have been issued to the offset project, the current or most recent (in the case of an offset project after the final crediting period), forest owner(s) must submit to DEP for placement in the Retirement Account a quantity of valid DEP offset credits or other approved compliance instruments pursuant to subchapter 4 in the amount equal to the number of DEP offset credits issued to the offset project for each Reporting Period, except for improved forest management forest offset projects. If the project is an improved forest management forest offset project, the amount of metric tons CO₂e reversed must be multiplied by the compensation rate in the Compliance Offset Protocol in section 147.273(a)(2)(C)4.

(A) DEP will notify the forest owner of how many DEP offset credits must be replaced with valid compliance instruments.

(B) The forest owner must submit to DEP for placement in the Retirement Account a valid DEP offset credit or another approved compliance instrument pursuant to subchapter 4 for each DEP offset credit required to be replaced within six months of DEP's retirement.

(C) If the forest owner does not submit valid DEP offset credits or other approved compliance instruments to DEP in the amount required pursuant to sections 147.283(c)(4) within six months of DEP's retirement, DEP will retire a quantity of DEP offset credits equal to the difference between the number of metric tons of CO_{2e} determined pursuant to sections 147.283(c)(4) and the number of retired approved compliance instruments from the Forest Buffer Account and they will be subject to enforcement action and each DEP offset credit retired from the Forest Buffer Account will constitute a separate violation pursuant to section 147.314.

(d) Disposition of Forest Sequestration Projects After a Reversal. If a reversal lowers the forest offset project's actual standing live carbon stocks below its project baseline standing live carbon stocks, the forest offset project will be terminated by DEP or an Offset Project Registry.

(1) If the forest offset project is terminated due to an unintentional reversal, DEP will retire from the Forest Buffer Account a quantity of DEP offset credits equal to the total number of DEP offset credits issued pursuant to section 147.281, and where applicable, all DEP offset credits issued to the offset project pursuant to the Program for Recognition of Early Action Offset Credits, over the preceding 100 years.

(2) If the forest offset project is terminated due to an unintentional reversal, another offset project may be initiated and submitted to DEP or an Offset Project Registry for listing within the same offset project boundary.

(3) If the forest offset project has experienced an unintentional reversal and its actual standing live carbon stocks are still above the approved baseline levels, it may continue without termination as long as the unintentional reversal has been compensated by the Forest Buffer Account. The Offset Project Operator or Authorized Project Designee must continue contributing to the Forest Buffer Account in future years as quantified in section 147.283(a)(1).

(4) If the forest offset project is terminated due to any reason except an unintentional reversal, new offset projects may not be initiated within the same offset project boundary, unless otherwise specified in a Compliance Offset Protocol.

§ 147.284. Ownership and Transferability of DEP Offset Credits.

(a) Initial ownership of a DEP offset credit will be with the registered Offset Project Operator, Authorized Project Designee, or another third party as requested by the Offset Project Operator pursuant to section 147.281(b)(5)(B) to receive DEP offset credits, unless otherwise required by section 147.283. A DEP offset credit may be sold, traded, or transferred, unless:

(1) It has been retired, surrendered for compliance, or used to meet any GHG mitigation requirements in any voluntary or regulatory program;

(2) It resides in the Forest Buffer Account pursuant to section 147.283; or

(3) It has been invalidated pursuant to section 147.285.

(b) A DEP offset credit may only be used:

(1) To meet a compliance obligation under this chapter, except if used by a covered entity in a program approved for linkage pursuant to subchapter 12; or

(2) By a Voluntarily Associated Entity for purposes of voluntary retirement.

§ 147.285. Invalidation of DEP Offset Credits.

(a) A DEP offset credit issued under this chapter will remain valid unless invalidated pursuant to this section.

(b) Timeframe for Invalidation. DEP may invalidate a DEP offset credit pursuant to this section within the following timeframe if a determination is made pursuant to section 147.285(f):

(1) Within eight years of the date that corresponds to the end of the Reporting Period for which the DEP offset credit is issued, if the DEP offset credit is issued pursuant to section 147.281.1, unless one of the following requirements is met:

(A) The Offset Project Operator or Authorized Project Designee for an offset project developed under the Compliance Offset Protocol in section 147.273(a)(2)(C)1 does all of the following:

1. Has a different verification body that has not verified the Offset Project Data Report for the issuance of DEP offset credits, and meets the requirements for

conflict of interest pursuant to section 147.279 and rotation of verification bodies pursuant to section 147.277.1(a), conduct a second independent regulatory verification pursuant to sections 147.277 through 147.278, except for section 147.277.1(b)(3)(M), for the same Offset Project Data Report. Although the requirements in section 147.277.1(b)(3)(M) do not need to be met under this section, any misreporting, discrepancies, and omissions found during the full offset verification services must be included in the offset material misstatement calculation performed pursuant to section 147.277.1(b)(3)(Q). If minor correctable errors that do not result in an offset material misstatement are found during the full offset verification services and the verification body does not identify any other nonconformance that would result in an adverse Offset Verification Statement, the verification body must issue a Qualified Positive Offset Verification Statement and identify the correctable errors on the Offset Verification Statement;

2. The second regulatory verification must be completed within three years of the issuance of the DEP offset credits through the submittal of an Offset Verification Statement pursuant to section 147.277.1(b)(3)(R)1, and the Offset Project Operator or Authorized Project Designee must receive a Positive or Qualified Positive Offset Verification Statement from the new verification body for the same Offset Project Data Report.

a. If the offset project is listed with an Offset Project Registry, the verification body must submit the detailed verification report and Offset Verification Statement for the second regulatory verification to the Offset Project Registry and DEP.

b. The Offset Project Registry must review the offset verification documents pursuant to section 147.287(e)(1)(E) and submit a report to DEP that includes the details and findings of the Offset Project Registry's review. During its review, the Offset Project Registry may request additional information from the verification body and Offset Project Operator or Authorized Project Designee, if applicable, and may request clarifications and revisions to the materials, if necessary.

c. The Offset Project Registry has 45 calendar days to review the offset verification information once complete and accurate verification documents are received from the verification body.

d. The Offset Project Registry has an additional 15 working days to submit its report to DEP. DEP will review the Offset Project Registry report and determine based on the report and all the information submitted by the verification body and Offset Project Operator or Authorized Project Designee, if applicable, if the invalidation timeframe will be reduced. During its review, DEP may request additional information, clarifications, and revisions to the materials, if necessary.

3. If the requirements in sections 147.285(b)(1)(A)1 and 2 are met, the DEP offset credits issued under the Offset Project Data Report may only be subject to invalidation within three years of the date that corresponds to the end of the Reporting Period for which the DEP offset credits are issued, if the DEP offset credits are issued pursuant to section 147.281;

or

(B) The Offset Project Operator or Authorized Project Designee for an offset project developed under one of the protocols listed in section 147.285(b)(1)(B). does the following:

1. Has a subsequent Offset Project Data Report verified pursuant to sections 147.277 through 147.278 by a different verification body than the one which conducted the most recent verification, and that meets the requirements for conflict of interest pursuant to section 147.279 and rotation of verification bodies pursuant to section 147.277.1(a); and

2. The verification conducted by a different verification body for the subsequent Offset Project Data Report and used to reduce the invalidation timeframe of any DEP offset credits must be completed through the submittal of an Offset Verification Statement pursuant to section 147.277.1(b)(3)(R)1 within, at a maximum, three years from the date that corresponds to the last time DEP offset credits were issued to the offset project. The verification of the subsequent Offset Project Data Report must result in a

Positive or Qualified Positive Offset Verification Statement from the new verification body.

3. If the requirements in sections 147.285(b)(1)(B)1 and 2 are met, the DEP offset credits issued pursuant to section 147.281 for no more than three Reporting Periods prior to the Reporting Period for which the subsequent Offset Project Data Report was verified by a different verification body may only be subject to invalidation within three years of the date that corresponds to the end of the Reporting Period for which the DEP offset credits are issued, if the DEP offset credits are issued pursuant to section 147.281.

4. If an offset project developed under one of the Compliance Offset Protocols listed in section 147.285(b)(1)(B)5 is in the last Reporting Period of a crediting period and will not have a renewed crediting period, the invalidation timeframe for up to the last three Reporting Periods may be reduced from eight years to three years if the following requirements are met for the last Offset Project Data Report of the crediting period:

a. The Offset Project Operator or Authorized Project Designee has a different verification body than has verified the Offset Project Data Reports identified in section 147.285(b)(1)(B)4. and that meets the requirements for conflict of interest pursuant to section 147.279 and rotation of verification bodies pursuant to section 147.277.1(a) conduct a second independent regulatory verification pursuant to sections 147.277 through 147.278, except for section 147.277.1(b)(3)(M), for the last Offset Project Data Report of the crediting period. Although the requirements in section 147.277.1(b)(3)(M) do not need to be met under this section, any misreporting, discrepancies, and omissions found during the full offset verification services must be included in the offset material misstatement calculation performed pursuant to section 147.277.1(b)(3)(Q); and

b. The second regulatory verification must be completed within three years of the issuance of the DEP offset credits through the submittal of an Offset Verification Statement pursuant to section 147.277.1(b)(3)(R)1. and the Offset Project Operator or Authorized Project Designee must receive a Positive or

Qualified Positive Offset Verification Statement from the new verification body for the same last Offset Project Data Report.

i. If the offset project is listed with an Offset Project Registry, the verification body must submit the detailed verification report and Offset Verification Statement for the second regulatory verification to the Offset Project Registry and DEP.

ii. The Offset Project Registry must review the offset verification documents pursuant to section 147.287(e)(1)(E) and submit a report to DEP that includes the details and findings of the Offset Project Registry's review. During its review, the Offset Project Registry may request additional information from the verification body and Offset Project Operator or Authorized Project Designee, if applicable, and may request clarifications and revisions to the materials, if necessary.

iii. The Offset Project Registry has 45 calendar days to review the offset verification information once complete and accurate verification documents are received from the verification body.

iv. The Offset Project Registry has an additional 15 working days to submit its report to DEP. DEP will review the Offset Project Registry report and determine based on the report and all the information submitted by the verification body and Offset Project Operator or Authorized Project Designee, if applicable, and may request additional information, clarifications, and revisions to the materials, if necessary.

(c) Grounds for Initial Determination of Invalidation. DEP may determine that an DEP offset credit is invalid for the following reasons:

(1) The Offset Project Data Report contains errors that overstate the amount of GHG reductions or GHG removal enhancements by more than 5.00 percent;

(A) If DEP finds that there has been an overstatement by more than 5.00 percent, DEP shall determine how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period. Within 10 calendar days of this

determination, DEP will notify the verification body that performed the offset verification and the Offset Project Operator or Authorized Project Designee. Within 25 calendar days of receiving the written notification by DEP, the verification body shall provide any available offset verification services information or correspondence related to the Offset Project Data Report. Within 25 calendar days of receiving the written notification by DEP, the Offset Project Operator or Authorized Project Designee shall provide data that is required to calculate GHG reductions and GHG removal enhancements for the offset project according to the requirements of this chapter, the detailed offset verification report prepared by the verification body, and other information requested by DEP. The Offset Project Operator or Authorized Project Designee shall also make available personnel who can assist DEP's determination of how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period.

1. DEP will determine the actual GHG reductions and GHG removal enhancements achieved by the offset project for the applicable Reporting Period based on, at a minimum, the following information:

- a. The GHG sources, GHG sinks, and GHG reservoirs within the offset project boundary for that Reporting Period; and

- b. Any previous Offset Project Data Reports submitted by the Offset Project Operator or Authorized Project Designee, and the Offset Verification Statements rendered for those reports.

2. In determining how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period, DEP may use the following methods, as applicable:

- a. The applicable Compliance Offset Protocol;

- b. In the event of missing data, DEP will rely on the missing data provisions pursuant to section 147.276, and, if applicable, the Compliance Offset Protocol; and

- c. Any information reported under this chapter for this Reporting Period and past Reporting Periods.

3. DEP shall determine how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period using the best information available, including the information in section 147.285(c)(1)(A)(1.) and methods in section 147.285(c)(1)(A)(2.), as applicable.

(B) If DEP determines that an overstatement has occurred pursuant to section 147.285(c)(1), DEP shall determine the amount of DEP offset credits that correspond to the overstatement using the following equation, rounded to the nearest whole ton:

$$\text{If } I_{\text{DEPOC}} > R_{\text{OPRC}} * 1.05$$

$$\text{Then } O_{\text{R}} + I_{\text{DEPOC}} - R_{\text{OPDR}}$$

Where:

“OR” is the amount of overstated GHG reductions and GHG removal enhancements for the applicable Offset Project Data Report, rounded to the nearest whole ton;

“ I_{DEPOC} ” is the number of DEP offset credits issued under the applicable Offset Project Data Report pursuant to section 147.281.1 or the Program for Recognition of Early Action Offset Credits;

“ R_{OPDR} ” is the number of GHG reductions and GHG removal enhancements determined by DEP pursuant to section 147.285(c)(1) for the applicable Offset Project Data Report;

(2) The offset project activity and implementation of the offset project was not in accordance with all local, regional, state, and national environmental and health and safety laws and regulations that apply based on the offset project location and that directly apply to the offset project, including as specified in the applicable Compliance Offset Protocol, as determined pursuant to section 147.273(b), during the Reporting Period for which the DEP offset credit was issued.

(A) For offset projects using a protocol from sections 147.273(a)(2)(C)1, 2, or 5, if DEP finds that the offset project is out of regulatory compliance, then DEP shall determine how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period. Within 10 calendar days of this determination, DEP will notify the verification body that performed the offset verification and the Offset Project Operator or Authorized Project Designee. Within 25 calendar days of receiving the written notification by

DEP, the verification body shall provide any available offset verification services information or correspondence related to the relevant Offset Project Data Report(s). Within 25 calendar days of receiving the written notification by DEP, the Offset Project Operator or Authorized Project Designee shall provide data that is required to calculate GHG reductions and GHG removal enhancements for the offset project according to the requirements of this chapter, the detailed offset verification report prepared by the verification body, and other information requested by DEP. The Offset Project Operator or Authorized Project Designee shall also make available personnel who can assist DEP's determination of how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period.

1. DEP will determine the actual GHG reductions and GHG removal enhancements achieved by the offset project for the applicable Reporting Period based on, at a minimum, the following information:

a. The GHG sources, GHG sinks, and GHG reservoirs within the offset project boundary for that Reporting Period;

b. Any previous Offset Project Data Reports submitted by the Offset Project Operator or Authorized Project Designee, and the Offset Verification Statements rendered for those reports; and

c. Any information relating to the regulatory compliance of the offset project provided by the Offset Project Operator, Authorized Project Designee, or regulatory oversight body.

2. In determining how many GHG reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period, DEP may use the following methods, as applicable:

a. The applicable Compliance Offset Protocol;

b. In the event of missing data, DEP will rely on the missing data provisions pursuant to section 147.276, and, if applicable, the Compliance Offset Protocol; and

c. Any information reported under this chapter for this Reporting Period and past Reporting Periods.

3. DEP shall determine how many GHG emission reductions and GHG removal enhancements were achieved by the offset project for the applicable Reporting Period using the best information available, including the information in section 147.285(c)(2)(A)(1.) and methods in section 147.285(c)(2)(A)(2.), as applicable.

4. If DEP determines that an offset project is out of regulatory compliance pursuant to section 147.285(c)(2), then DEP shall determine the amount of overstated DEP offset credits, rounded to the nearest whole number, that correspond to the time period that the offset project is determined to be out of regulatory compliance pursuant to section 147.273(b)(1)(E). All offset credits corresponding to this time period shall be deemed ineligible for crediting, and therefore any offset credits corresponding to this time period are subject to invalidation.

(B) For offset projects using a protocol from sections 147.273(a)(2)(C)3, 4, or 6. if DEP finds that the offset project is out of regulatory compliance, then DEP shall determine that all DEP offset credits issued for the applicable Reporting Period are subject to invalidation.

(3) DEP determines that offset credits have been issued in any other voluntary or mandatory program within the same offset project boundary and for the same Reporting Period in which DEP offset credits were issued for GHG reductions and GHG removal enhancements.

(4) The following shall not be grounds for invalidation:

(A) An update to a Compliance Offset Protocol will not result in an invalidation of DEP offset credits issued under a previous version of the Compliance Offset Protocol; or

(B) A reversal that occurs under a forest offset project. If such a reversal occurs the provisions in section 147.283 apply.

(d) Suspension of Transfers. When DEP makes an initial determination pursuant to section 147.285(c) it will immediately block any transfers of DEP offset credits for the applicable Offset Project Data Report. Once DEP makes a final determination pursuant to section 147.285(f) the block on transfers for any valid DEP offset credits will be cancelled.

(e) Identification of Affected Parties. If DEP makes an initial determination that one of the circumstances listed in section 147.285(c) has occurred, DEP will identify the following parties:

(1) The current holders that hold any DEP offset credits in their Holding and/or Compliance Accounts from the applicable Offset Project Data Report;

(2) The entities for which DEP transferred any DEP offset credits from the applicable Offset Project Data Report into the Retirement Account; and

(3) The current, or most recent (in the case of an offset project after the final crediting period), Offset Project Operator and Authorized Project Designee, and, for forest offset projects the current, or most recent (in the case of an offset project after the final crediting period), Forest Owner(s).

(f) Final Determination and Process of Invalidation. DEP will notify the parties identified in section 147.285(e) of its initial determination pursuant to section 147.285(c), and provide each party an opportunity to submit additional information to DEP prior to making its final determination, as follows:

(1) DEP will include the reason for its initial determination in its notification to the parties identified in section 147.285(e).

(2) After notification the parties identified in section 147.285(e) will have 25 calendar days to provide any additional information to DEP.

(3) DEP may request any information as needed in addition to the information provided under this section.

(4) The Department will have 30 calendar days after all information is submitted under this section to make a final determination that one or more conditions listed pursuant to section 147.285(c) has occurred and whether to invalidate DEP offset credits.

(A) The parties identified pursuant to section 147.285(e) will be notified of DEP's final determination of invalidation pursuant to this section.

(B) Any approved program for linkage pursuant to subchapter 12 will be notified of the invalidation at the time of DEP's final determination pursuant to this section.

(g) Removal of Invalidated DEP Offset Credits from Holding, Compliance, and/or Forest Buffer Accounts. If the Department makes a final determination pursuant to section 147.285(f) that a DEP offset credit is invalid, then:

(1) DEP offset credits will be removed from any Holding, Compliance, or Forest Buffer Account, as follows;

(A) If n DEP offset credit is determined to be invalid due to the circumstance listed in section 147.285(c)(1) or 147.285(c)(2)(A), then:

1. DEP will determine which DEP offset credits will be removed from the Compliance and/or Holding Accounts of each party identified in section 147.285(e)(1) according to the following equation, truncated to the nearest whole ton:

$$H_{DEPOC} = (TOT_{Holding} / I_{DEPOC}) O_R$$

Where:

“O_R” is the amount of overstated GHG reductions and GHG removal enhancements for the applicable Offset Project Data Report calculated pursuant to section 147.285(c)(1) or (c)(2)(A);

“I_{DEPOC}” is the number of DEP offset credits issued under the applicable Offset Project Data Report pursuant to section 147.281.1;

“TOT_{Holding}” is the total number of DEP offset credits currently being held in a Compliance and/or Holding Account by each party identified in section 147.285(e)(1) for the applicable Offset Project Data Report; and

“H_{DEPOC}” is the total number of DEP offset credits, rounded to the nearest whole ton, that will be removed from the Holding and/or Compliance Account of each party identified in section 147.285(e)(1).

2. DEP will determine the quantity of DEP offset credits issued under the applicable Offset Project Data Report in the amount calculated pursuant to section 147.285(g)(1)(A) and remove a quantity of DEP offset credits from any Holding and/or Compliance Account of the parties identified in section 147.285(e)(1).

3. DEP will determine the quantity of DEP offset credits issued under the applicable Offset Project Data Report, for all projects that contribute to the Forest Buffer Account, in the amount calculated pursuant to section 147.285(c)(1) or (c)(2)(A) multiplied by the project’s

reversal risk rating and remove that quantity of DEP offset credits from the Forest Buffer Account.

(B) If a DEP offset credit is determined to be invalid due to the circumstances listed in sections 147.285(c)(2)(B) or (c)(3), DEP will remove all DEP offset credits issued under the applicable Offset Project Data Report from any Holding and/or Compliance Account of the parties identified in section 147.285(e)(1), and from the Forest Buffer Account.

(2) The parties identified pursuant to section 147.285(e) will be notified of which serial numbers were removed from any Compliance, Holding, and/or Forest Buffer Accounts.

(3) Any approved program for linkage pursuant to subchapter 12 will be notified of which serial numbers were removed from any Compliance, Holding, and/or Forest Buffer Accounts.

(h) Requirements for Replacement of DEP Offset Credits. If an DEP offset credit that is issued to a non-sequestration offset project or an urban forest project, or that is issued to a U.S. forest offset project on or after July 1, 2014, and is in the Retirement Account, and it is determined to be invalid pursuant to section 147.285(f) for any circumstance listed in sections 147.285(c)(2)(B) and (c)(3), then:

(1) The party identified in section 147.285(e)(2) must replace each DEP offset credit it requested DEP to transfer into the Retirement Account for the applicable Offset Project Data Report with a valid DEP offset credit or another approved compliance instrument pursuant to subchapter 4, within six months of notification by DEP pursuant to section 147.285(g)(2).

(2) If the party identified in section 147.285(e)(2) does not replace each invalid DEP offset credit within six months of the notice of invalidation pursuant to section 147.285(g)(2), each unreplaced invalidated DEP offset credit will constitute a violation for that party pursuant to section 147.314.

(A) If the party identified in section 147.285(e)(2) is no longer in business DEP will require the Offset Project Operator identified in section 147.285(e)(3) to replace each invalidated DEP offset credit and will notify the Offset Project Operator that they must replace them.

(B) If the Offset Project Operator is required to replace the DEP offset credits, the Offset Project Operator must replace each DEP offset credit with a valid DEP offset credit or

another approved compliance instrument pursuant to subchapter 4, within six months of notification by DEP.

(C) If the Offset Project Operator is required to replace the DEP offset credits and the Offset Project Operator does not replace each invalid DEP offset credit within six months of notification by DEP, each unreplaced invalidated DEP offset credit will constitute a violation for that Offset Project Operator pursuant to section 147.314.

(3) The parties identified pursuant to section 147.285(e) will be notified of which serial numbers were invalidated.

(4) Any approved program for linkage pursuant to subchapter 12 will be notified of which serial numbers were invalidated.

(4) The Offset Project Operator, identified in section 147.285(e)(3), of an offset project that had DEP offset credits removed from the Forest Buffer Account pursuant to section 147.285(g)(1)(A)3. or (g)(1)(B) must replace a percentage of the DEP offset credits removed from the Forest Buffer Account equal to the percentage of DEP offset credits retired from the Forest Buffer Account for unintentional reversals as of the date the Secretary makes the final determination of invalidation, rounding up to the next whole number, with a valid DEP offset credit or another approved compliance instrument pursuant to subchapter 4, within six months of notification by DEP pursuant to section 147.285(g)(2). If the Offset Project Operator does not replace the required number of DEP offset credits within six months of notification by DEP pursuant to section 147.285(g)(2), each unreplaced invalidated DEP offset credit will constitute a violation for that Offset Project Operator pursuant to section 147.314.

(i) Nothing in this section shall limit the authority of the Commonwealth of Pennsylvania from pursuing enforcement action against any parties in violation of this chapter.

§ 147.286. Approval Requirements for Offset Project Registries.

(a) The approval requirements specified in this subchapter apply to all Offset Project Registries that will operate to provide registry services under this chapter.

(b) The Department may approve Offset Project Registries that meet and maintain the requirements specified in this section.

(1) Offset Project Registry Approval Application. To apply for approval as an Offset Project Registry, the applicant shall submit the following information to the Secretary:

- (A) Name of applicant;
- (B) Name of president or chief Secretary;
- (C) List of all board members, if applicable;
- (D) Addresses of offices located in the United States;
- (E) Documentation that the applicant carries at least five million U.S. dollars of professional liability insurance; and
- (F) List of any judicial proceedings and administrative actions filed against the applicant within the previous five years, with a detailed explanation as to the nature of the proceedings.

(2) The applicant must submit, in writing, the procedures to screen and address internal conflicts of interest. The applicant must provide the following information to the Department:

(A) A staff, management, and board member conflict of interest policy where there are clear criteria for what constitutes a conflict of interest. The policy must:

1. Identify specific activities and limits on monetary and non-monetary gifts staff, management, or board members must not conduct or accept to meet the Offset Project Registry's internal policies of conflict of interest policy, or alternatively provide a comprehensive policy on the applicant's requirements for the reporting of any and all conflicts based on internal policies that guard against conflict of interest; and
2. Include a requirement for annual disclosure by each staff, management, or board member of any items or instances that are covered by the applicant's conflict of interest policy on an ongoing basis or for the previous calendar year.
3. The applicant must have appropriate conflict of interest and confidentiality requirements in place for any of its contractors;

(B) List of all service types provided by the applicant;

- (C) The industrial sectors the applicant serves;
- (D) Locations where services are provided; and
- (E) A detailed organizational chart that includes the applicant and any parent, subsidiary, and affiliate companies.

(F) If the applicant under section 147.286 is going to designate a subdivision of its organization to provide registry services, then the prohibition in section 147.286(c)(1) on serving as an offset project consultant shall apply at the subdivision level and the applicant must provide the following general information for its self:

- 1. General types of services; and
 - 2. General locations where services are provided.
- (3) The applicant has the following capabilities for registration and tracking of registry offset credits issued under this chapter:

- (A) A comprehensive registration requirement for all registry participants;
- (B) Tracking ownership and transactions of all registry offset credits it issues at all times; and
- (C) Possesses a permanent repository of ownership information on all transactions involving all registry offset credits it issues under this chapter from the time they are issued to the time they are retired or cancelled.

(c) The applicant's primary business must be operating an Offset Project Registry for voluntary or regulatory purposes and meet the following business requirements:

- (1) The applicant may not act as an Offset Project Operator, Authorized Project Designee, or offset project consultant for offset projects registered or listed on its own Offset Project Registry and developed using a Compliance Offset Protocol once approved as an Offset Project Registry. The applicant must annually disclose to DEP any non-offset project related consulting services it provides to an Offset Project Operator or Authorized Project Designee who lists a project using a Compliance Offset Project with the applicant as part of the information included in the annual report required in section 147.287(j);

(2) The applicant may not act as a verification body or provide offset verification services pursuant to sections 147.277.1 and 147.277.2 once approved as an Offset Project Registry;

(3) If the applicant designates a subdivision of its organization to provide registry services, the applicant may not be an Offset Project Operator or Authorized Project Designee for offset projects listed at the subdivision's registry, act as a verification body, or be a covered entity or opt-in covered entity;

(4) The applicant must demonstrate experience in the continuous operation of a registry serving an Environmentally-focused Market for a minimum of two years in a regulatory and/or voluntary market. For the purposes of this section, an "Environmentally-focused Market" means a market that includes the trading of GHG-emissions based commodities. In the context of Air Quality Management Districts or Air Pollution Control Districts, "Environmentally-focused Market" includes a market for air emission reduction credits; and

(5) The applicant's primary incorporation or other business formation and primary place of business, or the primary place of business of the designated subdivision, if the applicant designates a subdivision to provide registry services pursuant to this section, must be in the United States of America.

(d) The Offset Project Registry must continue to maintain the professional liability insurance required in section 147.286(b) while it provides registry services to Offset Project Operators or Authorized Project Designees who are implementing offset projects using Compliance Offset Protocols.

(e) If any information submitted pursuant to sections 147.286(b) through (d) changes after the approval of an Offset Project Registry, the Offset Project Registry must notify the Secretary within 30 calendar days and provide updated information consistent with that required in sections 147.286(b) through (d).

(f) The Offset Project Registry must attest, in writing, to DEP as follows:

(1) "As the authorized representative for this Offset Project Registry, I understand that the Offset Project Registry is voluntarily participating in the Pennsylvania Cap-and-Trade

Program under 25 Pa. Code Chapter 147 and the Offset Project Registry is now subject to all regulatory requirements and enforcement mechanisms of this program.”;

(2) “All information generated and submitted to DEP by the Offset Project Registry related to an offset project that uses a Compliance Offset Protocol will be true, accurate, and complete.”;

(3) “All information provided to DEP as part of an DEP audit of the Offset Project Registry will be true, accurate, and complete.”;

(4) “All registry services provided will be in accordance with the requirements of section 147.287.”;

(5) “The Offset Project Registry is committed to participating in all DEP training related to DEP’s compliance offset program or Compliance Offset Protocols.”; and

(6) The authorized representative of the Offset Project Registry must attest in writing, to DEP: “I certify under penalty of perjury under the laws of the Commonwealth of Pennsylvania I have authority to represent the Offset Project Registry and all information provided as part of this application is true, accurate, and complete.”.

(g) At least two of the management staff at the Offset Project Registry must take DEP provided training on DEP’s compliance offset program and pass an examination upon completion of training.

(h) The Offset Project Registry must have staff members who have collectively completed DEP training and passed an examination upon completion of training in all Compliance Offset Protocols.

(i) The Offset Project Registry must have at least two years of demonstrated experience in, and requirements for, direct staff oversight and review of offset projects, project listing, offset verification, and registry offset credit issuance.

(j) DEP Approval.

(1) Within 60 calendar days of receiving an application for approval as an Offset Project Registry and completion by all management staff of the training required in section

147.286(g), the Department will inform the applicant in writing either that the application is complete or that additional specific information is required to make the application complete.

(2) The applicant may be allowed to submit additional supporting documentation before a decision is made by the Department.

(3) Within 60 calendar days following completion of the application process, the Secretary shall approve an Offset Project Registry if evidence of qualification submitted by the applicant has been found to meet the requirements of section 147.286 and issue an Executive Order to that effect.

(4) The Department and the applicant may mutually agree, in writing, to longer time periods than those specified in subsections 147.286(j)(1) and 147.286(j)(3).

(5) The Department approval for an Offset Project Registry is valid for a period of 10 years, whereupon the applicant may re-apply. At the time of re-application, the Offset Project Registry must:

(A) Demonstrate it consistently met all requirements in section 147.286;

(B) Pass a performance review, which, at a minimum shows the Offset Project Registry consistently:

1. Demonstrates knowledge of the DEP compliance offset program and Compliance Offset Protocols;

2. Meets all regulatory deadlines; and

3. Provides registry services in accordance with the requirements of this chapter; and

(C) Not have been subject to enforcement action under this chapter.

(k) Modification, Suspension, and Revocation of an Executive Order Approving an Offset Project Registry. The Department may review, and, for good cause, modify, suspend, or revoke approval to an Offset Project Registry.

(1) During revocation proceedings, the Offset Project Registry may not continue to provide registry services for DEP.

(2) Within five working days of suspension or revocation of approval, an Offset Project Registry must notify all Offset Project Operators or Authorized Project Designees for whom it is providing registry services or has provided registry services within the past 12 months of its suspension or revocation of approval.

(3) An Offset Project Operator or Authorized Project Designee who has been notified by an Offset Project Registry of a suspended or revoked approval must re-submit its offset project information with a new Offset Project Registry or DEP. An offset project listed at DEP or a new Offset Project Registry will continue to operate under its originally approved crediting period, provided that DEP may extend the crediting period or the relevant deadline in section 147.277(d) for one year if DEP determines that such extension is necessary to provide time for re-submission of information to the new Offset Project Registry or DEP.

(m) If the applicant under section 147.286 is going to designate a subdivision of its organization to provide registry services, all the requirements of section 147.286 may be applied at the designated subdivision level.

(n) An approved Offset Project Registry must make itself and its personnel available for a DEP audit.

§ 147.287. Offset Project Registry Requirements.

(a) The Offset Project Registry shall use Compliance Offset Protocols approved pursuant to section 147.271 to determine whether an offset project may be listed with the Offset Project Registry for issuance of registry offset credits. The Offset Project Registry may list projects under non-Compliance Offset Protocols but must make it clear any GHG emission reductions and GHG removal enhancements achieved under those protocols are not eligible to be issued registry offset credits or DEP offset credits.

(b) The Offset Project Registry must make the following information publicly available for each offset project developed under a Compliance Offset Protocol:

(1) Within 10 working days of the offset project listing requirements being deemed complete in section 147.275(f):

(A) Offset project name;

(B) Offset project location;

- (C) Offset Project Operator and, if applicable, the Authorized Project Designee;
 - (D) Type of offset project;
 - (E) Name and date of the Compliance Offset Protocol used by the offset project;
 - (F) Date of offset project listing submittal and Offset Project Commencement date;
- and
- (G) Identification if the offset project is in an initial or renewed crediting period;
- (2) Within 10 working days of the Offset Project Registry making a determination of registry offset credit issuance pursuant to section 147.280(b):
- (A) Reporting Period verified project baseline emissions;
 - (B) Reporting Period verified GHG reductions and GHG removal enhancements achieved by the offset project;
 - (C) The unique serial numbers of registry offset credits issued to the offset project for the applicable Offset Project Data Report;
 - (D) Total verified GHG reductions and GHG removal enhancements for the offset project by Reporting Period for when an Offset Project Data Report was submitted;
 - (E) The final Offset Project Data Report for each Reporting Period; and
 - (F) Offset Verification Statement for each year the Offset Project Data Report was verified; and
- (3) Clear identification of which offset projects are listed and submitting Offset Project Data Reports using Compliance Offset Protocols.
- (c) Conflict of Interest Review by Offset Project Registries. The Offset Project Registry must apply the conflict of interest requirements in section 147.279 when making a conflict of interest determination for a verification body proposing to conduct offset verification services under sections 147.277.1 and 147.277.2. The Offset Project Registry must review and make sure the conflict of interest submittal in section 147.279(e) is complete. When an Offset Project Operator or Authorized Project Designee submits its information pursuant to section

147.281(b) to DEP, the Offset Project Registry must provide DEP with the information and attestation identified in section 147.279(e) within 15 calendar days.

(d) The Offset Project Registry may provide guidance to Offset Project Operators, Authorized Project Designees, or offset verifiers for offset projects using a Compliance Offset Protocol, if there is no clear requirement for the topic in a Compliance Offset Protocol, this chapter, or a DEP guidance document, after consulting and coordinating with DEP.

(1) An Offset Project Registry must maintain all correspondence and records of communication with an Offset Project Operator, Authorized Project Designee, or offset verifier when providing clarifications or guidance for an offset project using a Compliance Offset Protocol.

(2) Before providing such guidance, the Offset Project Registry may request DEP to provide clarification on the topic.

(3) Any Offset Project Operator or Authorized Project Designee requests for clarifications or guidance must be documented and the Offset Project Registry response must be submitted on an ongoing monthly basis to DEP beginning with the date of approval as an Offset Project Registry.

(e) The Offset Project Registry must audit at least 10 percent of the annual full offset verifications developed for offset projects using a Compliance Offset Protocol.

(1) The audit must include the following checks:

(A) Attendance with the offset verification team on the offset project site visit;

(B) In-person or conference call attendance for the first offset verification team and Offset Project Operator or Authorized Project Designee meeting;

(C) In-person or conference call attendance to the last meeting or discussion between the offset verification team and Offset Project Operator or Authorized Project Designee;

(D) Documentation of any findings during the audit that cause the Offset Project Registry to provide guidance to, or require corrective action with, the offset verification team, including a list of issues noted during the audit and how those were resolved;

(E) A review of the detailed verification report and sampling plan to ensure that it meets the minimum requirements in sections 147.277.1 and 147.277.2 and documentation of any discrepancies found during the review; and

(F) An investigative review of the conflict of interest assessment provided by the verification body, which includes the following:

1. Discussions with both the lead verifier who submitted the conflict of interest assessment form and the Offset Project Operator or Authorized Project Designee to confirm the information on the conflict of interest assessment form is true, accurate, and complete;

2. An internet-based search to ascertain the existence of any previous relationship between the verification body and the Offset Project Operator or Authorized Project Designee, and if so the nature and extent; and

3. Any other follow up by the Offset Project Registry to have reasonable assurance that the information provided on the conflict of interest assessment form is true, accurate, and complete.

(2) All information related to audits of offset projects developed using a Compliance Offset Protocol must be provided to DEP within 10 calendar days of a DEP request.

(3) The audits must be selected to provide a representative sampling of geographic locations of all offset projects, representative sampling of verification bodies, representative sampling of lead verifiers, representative sampling of offset project types, and representative sampling of offset projects by size.

(4) The Offset Project Registry must provide an annual report to DEP by January 31 for its previous year's audit program of offset projects developed using Compliance Offset Protocols that includes:

(A) A list of all offset projects audited;

(B) Locations of all offset projects audited;

(C) Verification bodies associated with each offset project and names of offset verification team members;

(D) Dates of site visits;

- (E) Offset Project Registry staff that conducted the audit; and
- (F) Audit findings as required in section 147.287(e)(1)(D) through (F).
- (f) The Offset Project Registry must review each detailed verification report provided in section 147.277.1(b)(3)(R)(4)(a) for completeness and accuracy and to ensure it meets the requirements of section 147.277.1(b)(3)(R)(4)(a) before accepting the associated Offset Verification Statement for the Offset Project Data Report and issuing registry offset credits.
- (g) The Offset Project Registry must provide all information in its possession, custody, or control related to a listed offset project under a Compliance Offset Protocol within 10 calendar days of request by DEP.
- (h) The Offset Project Registry must make its staff and all information related to listed offset projects under Compliance Offset Protocols by the Offset Project Registry available to DEP during any audits or oversight activities initiated by DEP to ensure the requirements in section 147.287 are being carried out as required by this chapter.
- (i) The Offset Project Registry must remove or cancel any registry offset credits issued for an offset project using a Compliance Offset Protocol, such that the registry offset credits are no longer available for transaction on the Offset Project Registry system, once notified by DEP that the offset project is eligible to be issued DEP offset credits.
- (j) The Offset Project Registry must provide an annual report by January 31 of the previous year's offset projects that are listed using a Compliance Offset Protocol. The report must contain the name of the offset project, type of offset project and applicable Compliance Offset Protocol, name of Offset Project Operator or Authorized Project Designee, location of offset project, status of offset project, associated verification body, crediting period, amount of any registry offset credits issued to date, amount of any registry offset credits retired or cancelled for the offset project by the Offset Project Registry to date.
- (k) The Offset Project Registry may choose to offer insurance or other products to cover the risk of invalidation of DEP offset credits, but purchase or use of the insurance or other invalidation risk mechanisms will be optional for all entities involved with registry offset credits and DEP offset credit transactions.

§ 147.288. Record Retention Requirements for Offset Project Registries.

All information submitted, and correspondence related to, listed offset projects under Compliance Offset Protocols by the Offset Project Registry must be maintained by the Offset Project Registry for a minimum of 15 years.

Subchapter 14: Recognition of Compliance Instruments from Other Programs

§ 147.290. Sector-Based Offset Credits.

Sector-based offset credits may be generated through reduced or avoided GHG emissions from within, or carbon removed and sequestered from the atmosphere by, a specific sector in a particular jurisdiction. The Board may consider for acceptance compliance instruments issued from sector-based offset crediting programs that meet the requirements set forth in section 147.293 and originate from developing countries or from subnational jurisdictions within those developing countries, except as specified in subchapter 13.

§ 147.291. Procedures for Approval of Sector-Based Crediting Programs.

The Department may approve a sector-based crediting program in an eligible jurisdiction that is not automatically recognized under this Chapter. Provisions set forth in this chapter shall specify which compliance instruments issued by an approved sector-based crediting program may be used to meet a compliance obligation under this Chapter.

§ 147.292. Sources for Sector-Based Offset Credits.

Sector-based credits may be generated from reducing Emissions from Deforestation and Forest Degradation (REDD) Plans.

§ 147.293. Requirements for Sector-Based Offset Crediting Programs.

(a) General Requirements for Sector-Based Crediting Programs. The Department may consider for approval a sector-based crediting program which may include the following sectoral requirements:

(1) Sector Plan. The host jurisdiction has established a plan for reducing emissions from the sector.

(2) Monitoring, Reporting, Verification, and Enforcement. The program includes a transparent system that regularly monitors, inventories, reports, verifies, and maintains accounting for emission reductions across the program's entire sector, as well as maintains enforcement capability over its reference activity producing credits.

(3) Offset Criteria. The program has requirements to ensure that offset credits generated by the program are real, additional, quantifiable, permanent, verifiable and enforceable.

(4) Sectoral Level Performance. The program includes a transparent system for determining and reporting when it meets or exceeds its crediting baseline(s) and evaluating the performance of the program's sector during each program's crediting period relative to the business as usual or other emissions reference level.

(5) Public Participation and Participatory Management Mechanism. The program has established a means for public participation and consultation in the program design process.

(6) Nested Approach. If applicable, the program includes:

(A) Offset project-specific requirements that establish methods to inventory, quantify, monitor, verify, enforce, and account for all project-level activities

(B) A system for reconciling offset project-based GHG reductions in sector-level accounting from the host jurisdiction.

§ 147.294. Quantitative Usage Limit.

Sector-based offset credits approved by DEP for compliance are subject to the quantitative usage limit specified in section 147.154.

§ 147.295 Additional Mandatory Offset Protocols

DEP shall develop additional offset protocols, applying the standards set forth in this chapter for the following activities, as further provided in this section.

(a) Abandoned Minelands Reclamation Projects. DEP shall, before the effective date of this chapter, develop a protocol to provide offset credits for the reduction in GHG emissions resulted from the reclamation of abandoned minelands. These shall include credits for extinguishing underground mine fires and preventing and extinguishing fires in abandoned waste coal piles, as well as credit for reforestation. This protocol may include the credit for projects initiated before the effective date of this chapter. DEP may further issue allowances without charge to abandoned minelands projects without charge from the within the cap established under this chapter, including waste coal to energy facilities, notwithstanding the ineligibility of

electricity facilities, where DEP determines that such allowances will encourage the reclamation that would not otherwise occur. DEP may not give credit or award allowances in connection with reclamation of any project resulted from mining coal after 1980.

(b) Within two years of the effective date of this chapter, DEP shall develop and publish a compliance offset protocol offsets created by the capture and geologic sequestration of emissions from the combustion of biomass. No usage limitation shall apply to offsets created pursuant to this protocol.

Subchapter 15: Enforcement and Penalties

§ 147.310. Jurisdiction.

Any of the following actions shall conclusively establish a person's consent to be subject to the jurisdiction of the Commonwealth of Pennsylvania, including the administrative authority of DEP and the jurisdiction of the Environmental Hearing Board and the courts of the Commonwealth of Pennsylvania:

- (a) Registration with DEP pursuant to subchapter 5;
- (b) The purchase or holding of a compliance instrument issued by DEP, unless the entity holding the compliance instrument is registered in an approved External GHG ETS pursuant to subchapter 12;
- (c) Receipt of compensation of any kind, including sales proceeds and commissions, from any transfers of allowances or offset credits issued by DEP pursuant to subchapter 13 or recognized by DEP pursuant to subchapter 14; or
- (d) Verification of an offset credit to be issued by DEP.

§ 147.311. Authority to Suspend, Revoke, or Modify.

- (a) The Department may suspend, revoke, or place restrictions on the Holding Account of a voluntarily associated entity determined to be in violation of any provision of this chapter.
- (b) The Department may place restrictions on a Holding Account of a covered entity or an opt-in covered entity determined to be in violation of any provision of this chapter.
- (c) The Department may suspend, revoke, or modify any order issued under this chapter, including an order accrediting a verifier, for a violation of any provision of this chapter.

§ 147.312. Administrative Orders and Injunctions.

The Department may issue any order or seek any judicial remedy to enforce this chapter as authorized by the APCA.

§ 147.313. Penalties.

Penalties may be assessed pursuant to the APCA for any violation of this chapter.

§ 147.314. Violations.

(a) If an entity fails to surrender a sufficient number of compliance instruments to meet its compliance obligation as specified in sections 147.156 or 147.157, and the procedures in 147.157(c) have been exhausted, there is a separate violation of this chapter for each required compliance instrument that has not been surrendered, or otherwise obtained by the Department under 147.157(c).

(b) A separate violation accrues every 45 days after the end of the Untimely Surrender Period pursuant to section 147.157 for each required compliance instrument that has not been surrendered.

(c) If an entity exiting the program pursuant to section 147.135(f)(1) fails to place the appropriate number of allowances into its compliance account and notify the Department, as required under section 147.190(k), there is a separate violation

(d) It is a violation to submit any record, information or report required by this chapter that:

- (1) Falsifies, conceals, or covers up by any trick, scheme or device a material fact;
- (2) Makes any false, fictitious or fraudulent statement or representation;
- (3) Makes or uses any false writing or document knowing the same to contain any false, fictitious or fraudulent statement or entry; or

(4) Omits material facts from a submittal or record.

(5) A fact is material if it could probably influence a decision by the Department.

(e) The violations stated in section 147.314(c) are additional to violations of any obligations of any entity subject to this regulation under other provisions of this chapter requiring submissions to DEP to be true, accurate and complete.

Subchapter 16: Administration by Approved Local Agencies

§147.320. General Authorization.

(a) Any municipality or group of municipalities with an authorized air pollution program pursuant to 25 Pa. Code Chapter 133 may apply to the Department to administer this GHG Cap-and-Trade program, including the auction, as a part of its existing program.

(b) A municipality or group of municipalities wishing to administer this CHG Cap-and-Trade program shall submit to the Department for its approval such modifications of its existing program as necessary to administer this GHG cap-and-trade program.

§147.321. Allowances.

(a) No later than October 1 of each year, DEP shall allocate allowances to an approved local program equal to the emissions or product use requiring surrender in the jurisdiction with the approved program for the next calendar year.

(b) Allocated emissions shall be reduced for the municipality according to the same schedule as applicable to the statewide emissions budget.

§147.322. Auctions, Direct Distribution of Allowances and Auction Proceeds.

(a) A municipality with an approved program may conduct its own auction or may elect to participate in the auction administered by the Department, in which case the allowances allocated to the municipality shall be treated as if they were consigned to the auction.

(b) The municipality with an approved program shall be entitled to proceed from the auction or sale of allowances allocated to the municipality and may use the proceeds as designated by the municipality and in accordance with its duty as a trustee under Article I, § 27 of the Pennsylvania Constitution.

(c) The municipality may make such direct allocations of allowances as it deems appropriate, provided that such direct allocation will not result in leakage and cause perverse results that will encourage GHG emissions.

Subchapter 17: Other Provisions

§ 147.330. Severability, Effect of Judicial Order.

Each provision of this chapter shall be deemed severable, and in the event that any provision of this chapter is held to be invalid, the remainder of this chapter shall continue in full force and effect.

§ 147.331. Confidentiality.

(a) Emissions data submitted to DEP under this chapter is public information and shall not be designated as confidential.

(b) Any entity submitting information to the Department pursuant to this chapter may claim such information as “confidential” by clearly identifying such information as “confidential.” Any claim of confidentiality by an entity submitting information must be based on the entity’s belief that the information marked as confidential is either trade secret or otherwise exempt from public disclosure under the Pennsylvania Right to Know Law.

§ 147.332. Jurisdiction of Pennsylvania.

(a) Any party that participates in the Pennsylvania GHG Cap-and-Trade Program is subject to the jurisdiction of the Commonwealth of Pennsylvania unless the party is subject to the jurisdiction of an External GHG ETS to which Pennsylvania has linked its Cap-and-Trade Program pursuant to section 147.130(h) and subchapter 12.

(b) Notwithstanding section 147.310, subsection 147.322(a) or any other jurisdictional provision in this chapter, this chapter shall not be construed to abridge the rights and protections afforded foreign sovereigns, including the right of removal to federal court, pursuant to the Foreign Sovereign Immunities Act, 28 U.S.C. sections 1330, 1332, 1391(f), 1441(d), and 1602-1611.

(c) A party that has rights and protections under the Foreign Sovereign Immunities Act consents to civil enforcement of the laws, rules and regulations pertaining to this chapter in Pennsylvania’s courts, subject to the rights and protections afforded to entities subject to the Foreign Sovereign Immunities Act, including removal to federal court.

Appendix A

Entity Information
Legal Name
Operating Name
U.S. Federal Tax Employer Identification Number
Value Added Tax Identification Number
Data Universal Numbering System Number
Date of incorporation
Place of Incorporation
Country of Incorporation
Business Number (Assigned by Pennsylvania Agency)
Physical Address (City, State, postal Code)
Mailing Address (City, State, postal Code)
Country
Contact Information (Name, address, phone, email)
Website Address
Type of Organization

Individual Information
First Name
Middle Name
Last Name
Personal Residence Address
Phone number
Email
Social Security Number
Date of Birth
Citizenship
Employer Name
Employer Address
Copy of a valid identity card issued by a state or province with an expiration date
Copy of a government-issued identity document
Copy of a Passport
Documentation of an open bank account
Documentation of any felony convictions during the previous five years

Appendix B

CITSS User Terms and Conditions

ACCESS AGREEMENT AND TERMS OF USE FOR THE CITSS

SIGN THE BOTTOM OF THE PAGE TO INDICATE YOUR ACCEPTANCE OF THIS AGREEMENT.

Access to the Compliance Instrument Tracking System Service (CITSS) is subject to the terms and conditions set forth in this Access Agreement and Terms of Use (Agreement). You must accept this Agreement in order to access the CITSS application. Violation of this agreement may result in loss of access to CITSS and, if warranted, civil or criminal prosecution under state, provincial, or federal law.

This Agreement is between the Commonwealth of Pennsylvania, Department of Environmental Protection (DEP) and each registered Pennsylvania user of Compliance Instrument Tracking System Service (User). The Agreement sets forth the terms of use of CITSS. DEP provides User with access to the CITSS software application, for registering entities and holding compliance instrument. User understands and agrees that CITSS is provided “AS IS” and without any warranty, as set forth below in greater detail.

1. CITSS Use

1.1 DEP hereby grants to User, and User hereby accepts, subject to the terms and conditions set forth in this Agreement, a non-exclusive and non-transferable right to access CITSS via the world-wide-web or the internet at times when the software and servers are available and operating.

1.2 User further acknowledges that it is not authorized to and may not possess or distribute any or all parts of the PAITSS software, including its source codes and program components. User is not authorized to install, run or operate CITSS on User’s or third-party computers or servers.

1.3 User is solely responsible for ensuring that all information, data, text, or other materials that User provides to DEP through use of CITSS (Content) are true, accurate, and complete and comply with DEP’s requirements for the compliance with the cap-and-trade

program under the Pennsylvania Cap on Greenhouse Gas Emission and Market-Based Compliance Mechanisms (Regulation) (25 Pennsylvania Code Chapter 147).

1.4 User understands that DEP will retain and use the Content consistent with the applicable Regulation(s) and may disclose Content to the public to the extent the disclosure is required by Pennsylvania law or legal process, or to the extent that disclosure is not prohibited by Pennsylvania law.

1.5 DEP has included (as part of CITSS) security features including password protection to prevent a person other than the User from obtaining access through CITSS to User's Content. User understands that these security features depend on User protecting its password from disclosure to unauthorized persons. User also understands and acknowledges that despite security measures to prohibit unauthorized access to the Content through CITSS, unauthorized access could occur and in the event it does, DEP or WCI, Inc. may not be held liable for the unauthorized release of information, data, text or other materials that have been submitted to DEP using CITSS.

1.6 DEP does not endorse or provide support for software or web-based interfaces offered by third parties for purposes of submitting data to DEP. Use of a third-party interface or software product in order to access CITSS does not relieve the user of the need to ensure that information required by the applicable Regulation has been properly submitted to DEP and received by the applicable deadline and that all certifications required for use of CITSS have been submitted.

1.7 User is responsible for maintaining a copy of all data submitted to CITSS. The loss of electronic information, data, text, or other materials during use of CITSS or the unavailability of the CITSS system does not excuse User from the requirements in the applicable Regulation.

2. CITSS User Agreement

The permission granted in Section 1 above is expressly made subject to and limited by the following restrictions, in addition to the limitations and restrictions set forth in other sections of the Agreement:

2.1 User agrees not to access CITSS by any means other than using internet browsers.

2.2 User further agrees that it shall NOT:

- a. Deliberately attempt to access any data, documents, email correspondence, or programs contained on systems for which User does not have authorization;
- b. Engage in activity that may harass, threaten or abuse others, or intentionally access, create, store or transmit material which may be deemed offensive, indecent or obscene, or that is illegal according to local, state, provincial, or federal law;
- c. Engage in activity that may degrade the performance of CITSS;
- d. Deprive an authorized user access to CITSS;
- e. Obtain extra resources or login privileges beyond those authorized;
- f. Circumvent CITSS security measures;
- g. Violate copyright law of copyrighted material;
- h. Attempt to disassemble, decompile or reverse engineer CITSS;
- i. Attempt to create derivative works based on CITSS;
- j. Attempt to copy, reproduce, distribute or transfer CITSS;
- k. Provide access to CITSS to any third parties for any improper purpose;
- l. Obtain for personal benefit, or engage in political activity, unsolicited advertising, unauthorized fund raising, or solicit performance of any activity that is prohibited by any local, state, or federal law.

2.3 User's right to access CITSS automatically terminates upon User's violation of any provisions of this Agreement.

2.4 User further agrees that it will immediately inform DEP or the CITSS administrator by emailing help@wci-citss.org or calling at 1-866-682-7561 if any of the following occurs:

- a. User observes any unauthorized access or misuse of CITSS;
- b. User has any reason to believe that the security of their User ID, password, or security question(s) has been compromised;

c. User has any reason to believe that weaknesses in computer security, including unexpected software or system behavior, may result in unintentional disclosure of information or exposure to security threats.

2.5 User further agrees that:

a. User will maintain the security of their CITSS User ID, password, and security questions for use of the CITSS;

b. User will not disclose their CITSS User ID, password, and security questions information to anyone;

c. User will maintain an active email account listed in the CITSS at which User can receive important notifications of changes related to User's personal information or transfers involving any general account or compliance account that User represents as a Primary Account Representative, Alternate Account Representative, Account Viewing Agent, or other CITSS User;

d. Any submission User makes using the CITSS has and will have the same legal effect as if it were made in hardcopy form certified by User's handwritten signature.

2.6 If, at any time, User determines it is no longer able or willing to abide by the terms of this Agreement, User shall immediately cease all use of the CITSS and promptly notify DEP or the CITSS administrator in writing of its determination so that DEP or the CITSS administrator may formally suspend or revoke the User's access to the CITSS.

3. Disclaimer of Warranties

EXCEPT AS REQUIRED BY APPLICABLE LAW, THIS SERVICE IS MADE AVAILABLE ON AN "AS IS" BASIS, WITHOUT WARRANTIES OF ANY KIND. DEP SPECIFICALLY DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE SOFTWARE, OR ANY WARRANTIES REGARDING THE CONTENTS OR ACCURACY OF THE SOFTWARE.

4. Limitation on Liability

4.1 Except to the extent required by applicable law, in no event is DEP liable to User on any legal theory for damages of any kind arising from the use of or the inability to use the CITSS, even if DEP has been advised of the possibility of such damages. The unavailability of, or problems with the use of CITSS, does not excuse User from the reporting and compliance deadlines in the applicable Regulation.

5. Copyright and Proprietary Information

5.1 User shall not permit any person who is not registered as a User to access the CITSS and shall not copy, reproduce or distribute, or allow any other person to copy, reproduce or distribute, the CITSS, in whole or in part, without DEP's prior written consent.

6. Term

This Agreement commences upon User's acceptance of this Agreement and access to the CITSS for the first time. The Agreement shall terminate upon User's written notification to DEP under Section 2.5 of this Agreement or upon other termination or discontinuation of User's access to the CITSS, except that Sections 3, 4 and 5 survive any termination of this Agreement. DEP reserves the right to terminate this Agreement at any time, subject to the exception that Sections 3, 4 and 5 survive any termination of this Agreement.

7. Governing Law and General Provisions

This Agreement shall be governed by and construed in accordance with the laws of the Commonwealth of Pennsylvania. The failure of DEP to exercise or enforce any right or provision of this Agreement shall not constitute a waiver of such right or provision. If any provision of this Agreement is found by a court of competent jurisdiction to be invalid, the parties agree that the court should endeavor to give effect to the parties' intentions as reflected in the provisions, and the other provisions of the Agreement remain in full force and effect.

This Agreement is not intended to modify and cannot modify any provision in the applicable Regulation, including the Pennsylvania Cap on Greenhouse Gas Emission and Market-Based Compliance Mechanisms. If any part of this Agreement is found to conflict with any provision(s) in the applicable Regulation(s), the applicable Regulation(s) shall control.

This Agreement constitutes the entire agreement between User and DEP with respect to use of the CITSS. There are no understandings, agreements or representations with respect to the software program that are not specified in this Agreement.

This Agreement may only be modified in a writing signed by User and the Secretary of the DEP.

Appendix C: Quarterly Auction and Reserve Sale Dates

Exhibit C (Final)

**Robert B. McKinstry, Jr. & John C. Dernbach,
*Applying the Pennsylvania Environmental Rights
Amendment Meaningfully to Climate Disruption*, 9
Mich. J. Env't'l & Admin. L 50 (2018)**

APPLYING THE PENNSYLVANIA ENVIRONMENTAL RIGHTS AMENDMENT MEANINGFULLY TO CLIMATE DISRUPTION

Robert B. McKinstry, Jr. * and John C. Dernbach **

ABSTRACT

The Pennsylvania Constitution contains a unique Environmental Rights Amendment (ERA), which recognizes an individual right to “clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.” The ERA also includes a public trust element that makes “Pennsylvania’s public natural resources . . . the common property of all the people, including generations yet to come.” It makes the Commonwealth the “trustee of these resources,” requiring it to “conserve and maintain them for the benefit of all the people.” Recent decisions by the Pennsylvania Supreme Court (the Court) in Robinson Township v. Commonwealth and Pennsylvania Environmental Defense Foundation v. Commonwealth provide significant support for Pennsylvania regulations to address the threat of climate disruption posed by greenhouse gas (GHG) emissions to achieve net zero carbon emissions by the middle of this century.

In light of the threats that climate disruption poses to Pennsylvania’s public natural resources, the text of the ERA, and the principles articulated in those recent cases, we argue that a stable climate (a climate that has not been disrupted by anthropogenic emissions of GHGs) should be considered protected by the rights recognized by the ERA, and the public trust duties it creates. We argue that these rights and duties require Pennsylvania to employ regulatory measures to reduce GHG emissions to the level warranted by the social cost of carbon and to achieve carbon neutrality (net zero emissions) by mid-century. Further, we argue that there are judicially recognizable standards to compel the Commonwealth to exercise its existing authority to limit GHG emissions. In light of existing legislative authority, the obligations imposed by the United Nations Framework Convention on Climate Change, the Paris Agreement, and the federal Clean Air Act, we make the case that this regulatory program should take the form of an economy-wide cap-and-trade program providing for the auction of allowances with a reserve price based on the social cost of carbon and additional measures to prevent leakage and a cap reaching carbon neutrality by mid-century.

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** John C. Dernbach is Commonwealth Professor of Environmental Law and Sustainability at Widener University, Commonwealth Law School, and Director of its Environmental Law and Sustainability Center. He can be reached at jcdernbach@widener.edu. Thanks to Nathan Berry, Widener University Commonwealth Law School, Class of 2018, for research assistance.

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INTRODUCTION

In 1971, Pennsylvania voters overwhelmingly approved a nationally unique Environmental Rights Amendment (ERA) to the Pennsylvania Constitution, creating an individual right for all Pennsylvanians to “clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment.”¹ The ERA further made “Pennsylvania’s public natural resources . . . the common property of all the people, including generations yet to come,”² and made the Commonwealth the “trustee of these resources,”³ requiring it to “conserve and maintain them for the benefit of all the people.”⁴ Despite the ERA’s strong and clear language, for nearly half a century Pennsylvania courts left the provision toothless, substituting a three-part balancing test for the text of the ERA—a test completely divorced from the text that required little more than compliance with existing laws, and under which environmental advocates almost never won.⁵ In *Robinson Township v. Commonwealth (Robinson Township)* and *Pennsylvania Environmental Defense Foundation v. Commonwealth (PEDF)*, the Court dramatically reversed this approach, for the first time striking down acts of the General Assembly that it found to violate the ERA.⁶ In the *PEDF* case, the Court expressly rejected

1. PA. CONST. art. I, § 27.

2. *Id.*

3. *Id.*

4. *Id.*

5. See *infra* note 24 and accompanying text; *Payne v. Kassab*, 312 A.2d 86, 94 (Pa. Commw. Ct. 1973), *aff’d* 361 A.2d 263 (Pa. 1976).

The test bore no significant relationship to the text of Section 27. John C. Dernbach, *Taking the Pennsylvania Constitution Seriously When It Protects the Environment: Part II: Environmental Rights and Public Trust*, 104 DICK. L. REV. 97, 136-42 (1999). See John C. Dernbach & Marc Prokopchak, *Recognition of Environmental Rights for Pennsylvania Citizens: A Tribute to Chief Justice Castille*, 53 DUQ. L. REV. 335, 338-51 (2015); see *infra* discussion note 25.

6. See *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 969 (Pa. 2013) (plurality); *Pa. Envtl. Def. Found. v. Commonwealth*, 161 A.3d 911, 930-36 (Pa. 2017).

the three-part balancing test, and held that the text of the ERA itself should be the primary basis for interpreting and applying it.⁷ These decisions also confirmed that the ERA created enforceable individual rights to environmental protection and that the Commonwealth had a judicially enforceable duty as a trustee to protect those rights and to conserve the corpus of the environmental trust.⁸

The *PEDF* decision, in particular, provides significant support for meaningfully pricing GHG emissions based on the social costs of GHG-caused climate disruption. In *PEDF*, the Court held that the Commonwealth's duty as a trustee under Article I, § 27 of the Pennsylvania Constitution governs the disposition of natural gas lease revenues from state forest and park lands. It therefore struck down acts of the General Assembly that it found inconsistent with that duty. That legislation transferred monies received from gas leasing of state lands—which the Court held to represent “capital” or the corpus of the constitutional trust—into the General Fund, where it could be spent for purposes other than the conservation and maintenance of public natural resources.

Because climate disruption poses an existential threat to all of Pennsylvania's environmental trust resources, the logic of the *PEDF* decision leads to the conclusion that the ERA creates a duty for the Commonwealth to address climate disruption caused by GHG emissions. That conclusion, coupled with existing legislative authority, supports arguments for putting a meaningful price on those emissions, commensurate with the social cost of carbon. The *PEDF* decision also calls into question the General Assembly's ability to block regulations implementing programs for the protection of trust resources, including regulations addressing climate disruption.⁹ The decision's implications regarding use of revenues from allowances or fees on GHG emissions are less clear. The better arguments would allow all or substantial portions of the revenues to be used for the General Fund, as long as the revenues derive from actions that preserve, rather than deplete, the corpus of the trust.

Furthermore, the *PEDF* decision and its application to climate disruption will likely have consequences beyond Pennsylvania's borders because it provides a judicially manageable approach to implementing an environmental constitutional amendment. Although more than a third of all state constitutions include provisions regarding resource conservation and pollution, the provisions have tended to be more symbolic than legally meaningful, in no small part because courts have been unwilling or unable to find a way to enforce them.¹⁰ Moreover, many states apply a public trust doctrine similar to the standard incorporated into the Pennsyl-

7. See generally *PEDF*, 161 A.3d 911 at 930-36.

8. See *Robinson Twp.*, 83 A.3d at 969; *PEDF*, 161 A.3d 911 at 930-36.

9. See *PEDF*, 161 A.3d at 934-40.

10. Barton Thompson, *Constitutionalizing the Environment: The History and Future of Montana's Environmental Provisions*, 64 MONT. L. REV. 158-9 (2003).

vania ERA,¹¹ and a great many countries have environmental rights provisions in their constitutions.¹² Because *PEDF* enforces an environmental rights provision and provides a judicially manageable standard for doing so, the decision will likely be influential in the many other states and countries with comparable provisions.¹³

PEDF also can impact efforts elsewhere to use the public trust doctrine and environmental constitutional provisions to compel governments to reduce GHG pollution and prevent climate disruption. Some countries expressly address climate change in their constitutions, and a growing number of courts have found a right to climate justice in other provisions of their constitutions.¹⁴ Examples include both the Netherlands¹⁵ and at least one federal district court in the United States.¹⁶ In light of the hostility of the current U.S. administration to the issue of climate change, actions by the states to limit GHG emissions and to address the problem of climate disruption have become particularly significant. We argue that the analysis in *PEDF* matters for the states with constitutional environmental protection provisions or public trust obligations by showing how a constitutional environmental provision can support a petition for rulemaking to limit GHG emissions in order to limit climate disruption, and also support a regulatory agency's authority to subsequently adopt and implement such a rulemaking.

Finally, *PEDF* is one in a series of cases in which the Pennsylvania Supreme Court has applied cogent historical and textual analysis to restore moribund state

11. See Barton Thompson, *The Public Trust Doctrine: A Conservative Reconstruction and Defense*, 15 SE. ENVTL. L.J. 47, 50-55 (2006).

12. JAMES R. MAY & ERIN DALY, *GLOBAL ENVIRONMENTAL CONSTITUTIONALISM* (2015).

13. See John C. Dernbach, Kenneth T. Kristl, & James R. May, *Pennsylvania Environmental Defense Foundation v. Commonwealth of Pennsylvania: Recognition of Environmental Rights for Pennsylvania Citizens*, RUTGERS L. REV. (forthcoming 2018) (manuscript at 39), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3137074 (arguing that *PEDF* is a “formative case[]” which is likely to “shape shared conversation in the legal academy and elsewhere for generations to come”).

14. *Id.* at 39.

15. See *Rechtbank Den Haag* [Hague Court] 24 juni 2015, HA ZA 2015, 13-1396 m.nt. (Urgenda/State of the Netherlands) (Neth.) at 4.52 (holding that “a legal obligation of the State towards [Plaintiff] cannot be derived from Article 21 of the Dutch Constitution, . . . [but] these regulations still hold meaning, namely in the question . . . [of] whether the State has failed to meet its duty of care towards [Plaintiff].”); Robert B. McKinstry Jr., *Potential Implications for the United States of the Urgenda Foundation v. Netherlands Decision Holding that the UNFCCC and International Decisions Required Developed Nations to Reduce Emissions by 25 percent from 1990 Levels by 2020*, CLIMATE CHANGE, SUSTAINABLE DEV., & ECOSYSTEMS COMMITTEE NEWSLETTER, July 2016, at 30, 31, https://www.americanbar.org/content/dam/aba/publications/nr_newsletters/ccsde/201607_ccsde_authcheckdam.pdf (noting that in the same case “[u]ltimately, the court concluded that the plaintiffs’ standing to sue the state upon the Dutch state’s obligation to exercise ‘due care’ was based on Dutch constitutional law, the law of the EU, and international law.”).

16. See *Juliana v. United States*, 217 F. Supp. 3d 1224, 1241 (D. Or. 2017) (denying a motion to dismiss and holding that “[a]t its heart, this lawsuit asks this Court to determine whether defendants have violated plaintiffs’ constitutional rights. That question is squarely within the purview of the judiciary.”), *mandamus denied sub nom.*, *In re United States*, 884 F.3d 830 (9th Cir. 2018), No. 17-71692.

constitutional provisions to affect their original intent.¹⁷ In that respect, the court is emerging as an intellectual leader among state high courts.

In order best to explain the implications of the *PEDF* decision for climate disruption, we first discuss Article I, § 27 of the Pennsylvania Constitution and *Robinson Township* (Section I), and then analyze how *Robinson Township* was applied and extended in *PEDF* (Section II). Section III discusses the threats that climate disruption poses to Pennsylvania's public natural resources. In light of those impacts and the principles articulated in *Robinson Township* and *PEDF*, we make the case that a stable climate (a climate that has not been disrupted by anthropogenic emissions of GHGs) should be considered protected by the rights provided by the first clause of Article I, § 27 of the Pennsylvania Constitution, and protected by the public trust duties created by the second and third clauses. We then make the case in Section IV that the Commonwealth's duty to prevent climate disruption requires it to undertake measures to limit GHG emissions to the levels warranted by the social cost of carbon and to achieve carbon neutrality (net zero GHG emissions) by mid-century. We also argue that there are judicially recognizable standards to compel the Commonwealth to exercise its existing legislative authority to do so. Section V discusses the elements of a regulatory structure that can mitigate climate disruption. We argue that this structure should take the form of an economy-wide cap-and-trade program with allowances that are auctioned with a reserve price based on the social cost of carbon, accompanied by measures to prevent emissions "leakage." Section VI addresses issues relating to the prevention of leakage, distribution of allowances and the use of proceeds of an emissions auction. Finally, in Section VII we address limitations on the General Assembly's power to block such a regulatory program.

I. THE ENVIRONMENTAL RIGHTS AMENDMENT AND *ROBINSON TOWNSHIP*

The Environmental Rights Amendment to the Pennsylvania Constitution¹⁸ was approved in 1971 by the voters by a margin of nearly four to one.¹⁹ It contains

17. The jurisprudence extends beyond the *Robinson Township* and *PEDF* decisions giving meaning to the original intent of Article I, § 27. In *William Penn School District v. Pennsylvania Department of Education*, 170 A.3d 414 (Pa. 2017) the Pennsylvania Supreme Court reversed a dismissal of claims and interpreted the Education Clause in Article III, § 14 of the Pennsylvania Constitution to give meaning to its guarantee of "a thorough and efficient system of public education" in light of that clause's original intent. *William Penn Sch. Dist. v. Pa. Dep't of Educ.*, 170 A.3d 414 (Pa. 2017). In *League of Women Voters v. Commonwealth*, the Court interpreted the Free and Fair Elections Clause in Article I, § 5, of the Pennsylvania Constitution to give that clause its original meaning, invalidating the invidious practice of partisan gerrymandering. See *League of Women Voters v. Commonwealth*, 178 A.3d 737, 741 (Pa. 2018).

18. PA. CONST. art. I, § 27.

19. Franklin L. Kury, *The Environmental Amendment to the Pennsylvania Constitution: Twenty Years Later and Largely Untested*, 1 VILL. ENVTL. L.J. 123, 123 (1990).

three clauses. The first creates individual rights to environmental attributes.²⁰ The second creates additional rights by making Pennsylvania's public natural resources the property of all the people, including future generations.²¹ The third makes the Commonwealth, and its constituent units, trustees for the environment.²² Article I, § 27 provides:

The people have a right to clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment. Pennsylvania's public natural resources are the common property of all the people, including generations yet to come. As trustee of these resources, the Commonwealth shall conserve and maintain them for the benefit of all the people.²³

Shortly after the ERA was adopted, however, Pennsylvania's Commonwealth Court devised a three-part balancing test as a substitute for the text of the ERA. That test provided:

The court's role must be to test the decision under review by a threefold standard: (1) Was there compliance with all applicable statutes and regulations relevant to the protection of the Commonwealth's public natural resources? (2) Does the record demonstrate a reasonable effort to reduce the environmental incursion to a minimum? (3) Does the environmental harm which will result from the challenged decision or action so clearly outweigh the benefits to be derived therefrom that to proceed further would be an abuse of discretion?²⁴

The test bore no significant relationship to the text of Section 27, which speaks of enforceable constitutional rights and duties.²⁵ Over the four decades when the test

20. PA. CONST. art. I, § 27, cl. 1.

21. *Id.* cl. 2

22. *Id.* cl. 3.

23. PA. CONST. art. I, § 27.

24. *Payne v. Kassab*, 312 A.2d 86, 94 (Pa. Commw. Ct. 1973), *aff'd* 361 A.2d 263 (Pa. 1976).

25. *Dernbach*, *supra* note 5 at 136-42.

The test's requirement for compliance with applicable statutes and regulations is meaningless with regards to a constitutional provision and certainly could not apply to actions challenging a statute on constitutional grounds. Although something like the second and third prongs of the test might conceivably be applied in some fashion where a court was balancing one constitutional right, such as a private party's property right, against the constitutional right provided by the ERA in the context of a permit decision. But it is irrelevant to evaluation of the constitutionality of a statute or the government's failure to exercise its duty as a trustee to conserve and maintain trust resources.

Even in the context of a permitting decision, the test puts a heavy, and in cases, impossibly heavy burden on the party asserting its constitutional rights under the ERA to produce evidence that the resource has been impaired. In private trust law, a trustee's duty is to gather and make available to the beneficiaries complete and accurate information as to the nature and amount of the trust property. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 983, n.60 (Pa. 2013) (plurality); *see also In re Rosenblum's Estate*, 459 Pa. 201, 328 A.2d 158, 164-65 (1974) (citing RESTATEMENT (SECOND) OF TRUSTS § 173)

was applied, parties invoking the ERA almost never prevailed.²⁶ Until the *Robinson Township* decision in 2013, no court had used the ERA to hold a statute or regulation unconstitutional.²⁷ In that case, however, a plurality of the Court used the ERA for precisely that purpose.

The legislation challenged in *Robinson Township* addressed the regulation of natural gas resources in the Commonwealth, particularly shale gas. The legislation superseded local governments' control over land use, as well as those governments' case-by-case consideration of the impacts of gas development on the natural environment.²⁸ Chief Justice Castille's plurality opinion held that the legislative crea-

(right of access to trust records is essential part of beneficiary's right to complete information concerning administration of trust; right of inspection has independent source in beneficiary's property interest in trust estate); see also RESTATEMENT (SECOND) OF TRUSTS § 173 *cm. c* (“[B]eneficiary is always entitled to such information as is reasonably necessary to enable him to enforce his rights under the trust or to prevent or redress a breach of trust.”). This is consistent with § 83 of the RESTATEMENT (THIRD) OF TRUSTS, which states “A trustee has a duty to maintain clear, complete, and accurate books and records regarding the trust property and the administration of the trust, and, at reasonable intervals on request, to provide beneficiaries with reports or accountings.”

This disparate burden also violates the rule of impartiality, favoring the developer over the rights of the parties invoking the ERA. RESTATEMENT (SECOND) OF TRUSTS § 183 (“When there are two or more beneficiaries of a trust, the trustee is under a duty to deal impartially with them”). RESTATEMENT (SECOND) OF TRUSTS § 183 (1959); see also RESTATEMENT (THIRD) OF TRUSTS § 79(1) (2005). This principle is illustrated in *Estate of Sewell*, where the Pennsylvania Supreme Court found that the trustee had violated its fiduciary duty by benefiting one beneficiary at the expense of another. 487 Pa. 379, 383, 409 A.2d 401, 402 (1979) (holding against the trustee where they failed to confirm the existence of an additional beneficiary while continuing to give all benefits to the known beneficiary).

26. See John C. Dernbach & Marc Prokopchak, *Recognition of Environmental Rights for Pennsylvania Citizens: A Tribute to Chief Justice Castille*, 53 DUQ. L. REV. 335, 344-51 (2015).

27. See *id.* (explaining that the ERA was invoked to challenge decisions by state agencies and local governments, but not identifying any cases in which the ERA was invoked to challenge the constitutionality of a statute).

28. *Robinson Twp.*, 83 A.3d at 979.

The statute's new regulatory regime permitting industrial uses as a matter of right in every type of pre-existing zoning district is incapable of conserving or maintaining the constitutionally-protected aspects of the public environment and of a certain quality of life. In Pennsylvania, terrain and natural conditions frequently differ throughout a municipality, and from municipality to municipality. As a result, the impact on the quality, quantity, and well-being of our natural resources cannot reasonably be assessed on the basis of a statewide average. Protection of environmental values, in this respect, is a quintessential local issue that must be tailored to local conditions.

Section 3215(d) marginalizes participation by residents, business owners, and their elected representatives with environmental and habitability concerns, whose interests Section 3215 ostensibly protects. See 58 PA. CONS. STAT. § 3202 (2011) (Declaration of purpose of chapter). The result is that Section 3215 fosters decisions regarding the environment and habitability that are non-responsive to local concerns; and, as with the uniformity requirement of Section 3304, the effect of failing to account for local conditions causes a disparate impact upon beneficiaries of the trust. Moreover, insofar as the Department of Environmental Protection is not required, but is merely permitted, to account for local concerns in its permit decisions, Section 3215(d) fails to ensure that any disparate effects are attenuated. Again, in-

tion of uniform rules interfered with the municipalities' duties as trustees under Article I, § 27, and that the rules were therefore unconstitutional.²⁹

The plurality in *Robinson Township* based its construction of the ERA primarily on the plain language of the provision and its legislative history.³⁰ It found that its construction was supported by consideration of “the occasion and necessity for the constitutional provision, . . . the circumstances of enactment and ratification, the mischief to be remedied and the object to be attained.”³¹ The plurality discussed at length Pennsylvania's long history of environmental abuse in connection with coal mining, deforestation, pollution, and wildlife eradication.³² These abuses provided the impetus for the ERA's adoption.³³ The opinion noted that the challenged law was written to encourage a gas extraction boom that posed the risk of causing similar environmental degradation.³⁴ In striking down the portions of the law that limited the power of local governments and state agencies to exercise their obligation as trustees to prevent degradation, diminution, and depletion of constitutionally protected natural resources, the plurality opinion articulated the following key legal principles:

- The rights provided by the first and second clauses of the ERA represent fundamental, individual rights akin to free speech, freedom of religion and other rights enumerated in Article I of the Pennsylvania Constitution, and they should be interpreted as such.³⁵
- The first clause “affirms a limitation on the state's power to act contrary” to the people's right to “clean air, pure water, and the preservation of the natural, scenic, historic, and esthetic values of the environment.” As a result, “laws of the Commonwealth that unreasonably impair the right are unconstitutional.”³⁶

equitable treatment of trust beneficiaries is irreconcilable with the trustee duty of impartiality.

Id. at 984.

29. *Id.*

30. See *Robinson Twp.*, 83 A.3d at 950-959. For a complete legislative history, see John C. Dernbach & Edmund J. Sonnenberg, *A Legislative History of Article 1, Section 27 of the Constitution of the Commonwealth of Pennsylvania, Showing Source Documents* (2015), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2474660. A companion version that does not show photocopies of pages of source documents is John C. Dernbach & Edmund J. Sonnenberg, *Legislative History: Article 1, Section 27 of the Constitution of the Commonwealth of Pennsylvania*, 24 WIDENER L.J. 181 (2015).

31. *Robinson Twp.*, 83 A.3d at 960.

32. *Id.* at 960-963.

33. *Id.* at 961 (“With these events in the recent collective memory of the General Assembly, the proposed Environmental Rights Amendment received the unanimous assent of both chambers during both the 1969–1970 and 1971–1972 legislative sessions.”).

34. *Id.* at 976.

35. *Id.* at 953-54, 976.

36. *Id.* at 951.

- “The drafters seemingly signaled an intent that the concept of public natural resources would be flexible to capture the full array of resources implicating the public interest, as these may be defined by statute or at common law.”³⁷
- The public natural resources that are made the property of all the people by the second clause and the subject of the Commonwealth’s duty as a trustee include “not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property.”³⁸ The constitutional rights created by the second clause of the ERA include the right to enforce the duty of a trustee created by the third clause.³⁹
- The public trust provisions of the ERA are self-executing, as they create constitutional duties that bind all three branches of state government, and they can be applied and enforced by the judicial branch without further legislative action.⁴⁰
- The Commonwealth’s duties as a trustee should be governed by the established law applicable to trusts and trustees, including the legal principles articulated in the Restatement of Trusts.⁴¹ These trustee duties include prudence (“exercise[ing] ordinary skill, prudence and caution in managing corpus of trust”), loyalty (administering the trust “solely in beneficiary’s” interest), and impartiality (“treat[ing] all [beneficiaries] equitably in light of the purposes of the trust”).⁴²

The plurality opinion, however, received votes from only three of the Court’s seven justices.⁴³ Justice Baer supported the plurality’s decision on a separate basis—substantive due process.⁴⁴ While the *Robinson Township* decision sketched a view of what Article I, § 27 could ultimately mean, it did not enshrine these principles as law.

37. *Id.* at 955.

38. *Id.*

39. *Id.* at 955-56.

The third clause of Section 27 establishes the Commonwealth’s duties with respect to Pennsylvania’s commonly-owned public natural resources, which are both negative (*i.e.*, prohibitory) and affirmative (*i.e.*, implicating enactment of legislation and regulations). The provision establishes the public trust doctrine with respect to these natural resources (the corpus of the trust) and designates ‘the Commonwealth’ as trustee and the people as the named beneficiaries.

40. *See id.* at 966-67.

41. *Id.* at 955-57.

42. *Id.* at 957, 959.

43. *Id.* at 1000.

44. *Id.* at 1000-1001.

II. THE DECISION IN *PEDF*

In *PEDF*, the Court reaffirmed the *Robinson Township* principles and made them the applicable law of Article I, § 27. The plaintiff in *PEDF* challenged a series of legislative enactments that eliminated requirements that revenues from gas development leases on state forest and park lands be used for conservation purposes; these enactments transferred oil and gas leasing revenues to the general fund.⁴⁵ The challenged legislation thus significantly changed the disposition of revenues dedicated to the Oil and Gas Lease Fund, administered by the Department of Conservation and Natural Resources (DCNR).⁴⁶ The Fund was created by a 1955 Act⁴⁷ requiring “[a]ll rents and royalties from oil and gas leases of any” Commonwealth land to be deposited in the fund and “exclusively used for conservation, recreation, dams, or flood control.”⁴⁸ The challenged legislation transferred much of the money that would have been deposited in the Lease Fund to the General Fund, where it could be used for any purpose authorized by the General Assembly.⁴⁹ The challenged legislation also created a cap on revenues committed to DCNR under the Lease Fund, rather than requiring *all* moneys received from gas leasing to be used for conservation and maintenance of environmental trust resources.⁵⁰

The plaintiff challenged these enactments in Commonwealth Court as violative of the public trust clauses of Article I, § 27.⁵¹ The Commonwealth Court granted summary judgment to the Commonwealth, holding that there was no violation of the constitutional public trust.⁵² In reversing the Commonwealth Court, a majority of the Court reaffirmed the breadth of the *Robinson Township* decision and

45. Pa. Env'tl. Def. Found. v. Commonwealth, 161 A.3d 911, 916, 921-25 (Pa. 2017).

Three legislative amendments to the state fiscal code between 2008 and 2014 redirected a total of \$335 million that would have been used for conservation purposes under the [Lease Fund Act] to the general fund, where it is appropriated for a variety of state government purposes. In addition, the Legislature prevented DCNR from spending any [Lease Fund Act] royalties without prior legislative authorization. Finally, the Legislature began using [Lease Fund] revenue to support the overall budget of DCNR, rather than obtaining that budget money from the general fund and using [Lease Fund] money for conservation purposes related to oil and gas extraction.

Id. (citing John C. Dernbach, *The Potential Meanings of a Constitutional Public Trust*, 45 ENVTL. L. 463, 488 (2015) (internal citations omitted)).

46. *Id.*

47. Oil and Gas Lease Fund Act, 71 PA. CONS. STAT. § 1331 (2017).

48. *Id.*

49. *PEDF*, 161 A.3d at 921-24.

50. *Id.*

51. *Id.* at 925-26, 928

52. *Id.* at 928.

Article I, § 27 rights and duties, and it quoted extensively from *Robinson Township*.⁵³ The Court held:

Because state parks and forests, including the oil and gas minerals therein, are part of the corpus of Pennsylvania's environmental public trust, we hold that the Commonwealth, as trustee, must manage them according to the plain language of Section 27, which imposes fiduciary duties consistent with Pennsylvania trust law. We further find that the constitutional language controls how the Commonwealth may dispose of any proceeds generated from the sale of its public natural resources.⁵⁴

The Court's recitation of the facts suggests that the Court viewed the General Assembly's actions as looting a fund (the Lease Fund) dedicated to conservation of state forests and parks in order to fund a budget deficit in a way that would interfere with maintenance of those lands.⁵⁵ The Court found this change significant because "DCNR had anticipated receiving the full amount of the rents and royalties to allow it to oversee the rapid expansion of drilling on state land when it decided to enter into the 2008 Leases."⁵⁶ The legislation further restricted the environmental purposes for which the now-limited revenues going into the Lease Fund could be used.⁵⁷ The Court characterized the challenged actions as "transfers of capital."⁵⁸

The portions of the opinion of greatest significance for regulation of GHGs relate to the standard of review under Article I, § 27 and the contours of the ERA.⁵⁹ The Court began by rejecting outright the three-part balancing test that had been used as a substitute for the text of the ERA, saying that the test "strips the constitutional provision of its meaning."⁶⁰ The Court then stated that the first two clauses of the ERA created rights that were "excepted out of the general powers of government" and that those rights, like all other rights articulated in Article

53. *Id.* at 916-921 (quoting *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 960-63 (Pa. 2013) (plurality)), 929-933, 936, 938.

54. *PEDF*, 161 A.3d at 916.

55. *See Robinson Twp. v. Commonwealth*, 83 A.3d 901, 955-56 (Pa. 2013) (plurality).

The third clause of Section 27 establishes the Commonwealth's duties with respect to Pennsylvania's commonly-owned public natural resources, which are both negative (*i.e.*, prohibitory) and affirmative (*i.e.*, implicating enactment of legislation and regulations). The provision establishes the public trust doctrine with respect to these natural resources (the corpus of the trust) and designates 'the Commonwealth' as trustee and the people as the named beneficiaries.

Id.

56. *PEDF*, 161 A.3d at 922.

57. *Id.*

58. *Id.* at 924.

59. *Id.* at 930-36.

60. *Id.* at 930.

I of the Pennsylvania Constitution, “shall forever remain inviolate.”⁶¹ It noted that the “public natural resources”⁶² that were made the property of the people included both the state forest and park lands and “the oil and gas themselves.”⁶³ The Court explained that the original draft of the second sentence of the ERA provided that the property of the people (including future generations) extended to “Pennsylvania’s natural resources, including the air, waters, fish, wildlife, and the public lands and property of the Commonwealth. . . .” The Court further explained that this language was revised to remove the enumerated list and thereby discourage courts from limiting the scope of natural resources covered.” Because there was no stated problem with the list of natural resources contained in the original draft, the list in the original draft of the second sentence represents a minimum list of the public natural resources protected by the ERA.⁶⁴ The items on this list are therefore the property of all the people.⁶⁵

The Court then elaborated on the trustee duties created by the third clause of the ERA, adopting the *Robinson Township* interpretation of that clause as imposing upon the Commonwealth a fiduciary duty equivalent to that imposed upon trustees by existing trust law, with that duty extending to the public, including future generations.⁶⁶ The Court discussed the applicable duties imposed on trustees as set forth in the Restatement (Second) of Trusts, noting that these duties include the requirement that a trustee “manage the trust so as to give all of the beneficiaries due regard for their respective interests in light of the purposes of the trust.”⁶⁷ The Court summarized the duties created by Article I, § 27, as follows:

Pennsylvania’s environmental trust thus imposes two basic duties on the Commonwealth as the trustee. First, the Commonwealth has a duty to prohibit the degradation, diminution, and depletion of our public natural resources, whether these harms might result from direct state action or from the actions of private parties. Second, the Commonwealth must act affirmatively via legislative action to protect the environment. Although a trustee is empowered to exercise discretion with respect to the proper

61. *Id.* at 930-31 (quoting *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 948 (Pa. 2013) (plurality), quoting PA. CONST. art. I, § 25).

62. *Id.* at 931.

63. *Id.*

64. *Id.*

65. *Id.* (citing PA. LEGIS. JOURNAL, 154th General Assembly, No. 118, Reg. Sess., 2274 (1970) (Broughton Analysis)). In a footnote, the Court explained that the word “public” was added to modify “natural resources” to indicate that the public’s rights and the trust obligations did not extend to “purely private property rights.” The Court also noted that the ERA’s author and principal advocate opined that this limitation did not apply to resources, such as those originally enumerated, that “involve a public interest.” *Id.*, n.22 (quoting PA. LEGIS. JOURNAL, 154th General Assembly, No. 118, Reg. Sess., 2271-72 (1970) (statement by Rep. Kury)).

66. *Pa. Env’tl. Def. Found. v. Commonwealth*, 161 A.3d 911, 932 (Pa. 2017).

67. *Id.* at 933.

treatment of the corpus of the trust, that discretion is limited by the purpose of the trust and the trustee's fiduciary duties, and does not equate "to mere subjective judgment." The trustee may use the assets of the trust "only for purposes authorized by the trust or necessary for the preservation of the trust; other uses are beyond the scope of the discretion conferred, even where the trustee claims to be acting solely to advance other discrete interests of the beneficiaries."⁶⁸

In a footnote, the Court expressly rejected the dissent's contention that its holding would cordon off hundreds of millions of dollars for other budgetary uses, noting that this question was never raised and was not before the Court.⁶⁹

Consequently, the Court held that if the trustee was disposing of the assets of the trust, it was bound to use the proceeds in ways necessary and appropriate for carrying out the purposes of the trust, which in the case of the ERA was the maintenance and conservation of public natural resources.⁷⁰ The Court rejected the plaintiff's argument that "all revenues generated by oil and gas leases [needed to] remain in the corpus of the trust."⁷¹ It held that the royalties arose from the sale of principal and were therefore in the trust.⁷² The Court said it was less clear how to categorize other revenue streams from gas leasing, and that additional advocacy was required to determine whether those revenues constituted principal or income.⁷³

Reaffirming the plurality opinion in *Robinson Township*, the Court rejected an argument raised by the Republican Caucus of the General Assembly that the public trust provisions of Article I, § 27 were not self-executing but instead required implementing legislation.⁷⁴ It also reaffirmed the *Robinson Township* plurality opinion "that the Commonwealth's obligations as trustee 'create a right in the people to seek to enforce the obligations.'"⁷⁵

Applying its explanation of Article I, § 27 to the legislation at issue, the Court concluded that in transferring royalties from a restricted fund to the unrestricted General Fund, the Commonwealth did not "contemplate, let alone reasonably exercise, its duties as the trustee of the environmental public trust created by the" ERA.⁷⁶ The Court thus invalidated the provisions relating to the transfer of royalties,⁷⁷ which meant that the prior statutory dedication of the Lease Fund resources

68. *Id.* (internal citations omitted).

69. *Id.* at n.25.

70. *Id.* at 933-35.

71. *Id.* at 935.

72. *Id.*

73. *Id.* at 935-36.

74. *Id.* at 936-37.

75. *Id.* at 937.

76. *See id.*

77. *Id.* at 937-38.

to DCNR applied.⁷⁸ The Court emphasized that its holding did not require that the revenues constituting the corpus of the trust be included in the restricted fund or even be dedicated to DCNR, as long as the funds were used for the purpose of the trust, *viz.* “maintenance and conservation” of Article I, § 27 resources.⁷⁹ The matter was remanded to the Commonwealth Court to make a determination with respect to other revenues.⁸⁰

III. ARTICLE I, § 27 APPLIES TO CLIMATE DISRUPTION

Climate disruption already adversely affects Pennsylvania, and these adverse effects will increase over time. The severity of future impacts depends to a great extent on what actions are taken to reduce greenhouse gas emissions and even remove carbon dioxide from the atmosphere.⁸¹ Yet under Article I, §27, the people of the Commonwealth have a right to a natural climate that is not disrupted by excessive concentrations of GHGs in the atmosphere. In addition, the Commonwealth has a commensurate duty to limit emissions to prevent climate disruption.

A. The Impact of Climate Disruption on Pennsylvania

The existing and projected adverse effects of climate change on the nation and the world have been well documented and explained. Sources include the U.S. Environmental Protection Agency’s 2009 finding under the Clean Air Act that emissions of greenhouse gases from motor vehicles may reasonably be expected to endanger public health and welfare, which was upheld on judicial review.⁸² They also include multiple reports of the U.S. Global Change Research Program, including its 2017 report;⁸³ multiple reports of the National Research Council (NRC) of the

78. *Id.* at 939.

79. *Id.* at 939.

80. *Id.*

81. TIM FLANNERY, *THE WEATHER MAKERS* 167-202 (2005); RICHARD B. ALLEY, *THE TWO-MILE TIME MACHINE* 181-92 (2000), <https://muse.jhu.edu/book/36460>.

82. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule, 74 Fed. Reg. 66,496, 66,497-66,514 (Dec. 15, 2009) [hereinafter *Endangerment Finding*], *aff’d* *Coal. for Responsible Regulation, Inc. v. U.S. E env’tl. Prot. Agency*, 684 F.3d 102 (D.C. Cir. 2012), *aff’d in part and rev’d in part on other grounds sub nom. Utility Air Regulatory Grp. v. E env’tl. Prot. Agency*, 134 S. Ct. 2427 (2014) (*UARG*).

83. *See, e.g.*, U.S. GLOBAL CHANGE RESEARCH PROGRAM, *CLIMATE SCIENCE SPECIAL REPORT: FOURTH NATIONAL CLIMATE ASSESSMENT, VOLUME I* (2017), https://science2017.globalchange.gov/downloads/CSSR2017_FullReport.pdf; *see also* John C. Dernbach & Robert Altemburg, *Evolution of U.S. Climate Policy*, in *GLOBAL CLIMATE CHANGE AND U.S. LAW* 84-87 (Michael B. Gerrard & Jody Freeman eds. 2014) (explaining authorizing legislation for U.S. Global Change Research Program and describing some earlier reports).

National Academy of Sciences;⁸⁴ the reports of the Intergovernmental Panel on Climate Change;⁸⁵ numerous reports of other national academies of science;⁸⁶ and even judicial decisions.⁸⁷

State-specific information also exists for Pennsylvania. The Pennsylvania Climate Change Act requires the Department of Environmental Protection (DEP) to produce a report every three years on the actual and projected impacts of climate change on the state.⁸⁸ DEP's 2015 report on the impacts of climate change in Pennsylvania⁸⁹ makes clear that the effects of climate disruption on Pennsylvania's public natural resources are likely to exceed the impacts of uncontrolled coal mining, deforestation, and industrial development that motivated Section 27's adoption. These historical effects are described in *Robinson Township* and *PEDF* at length.⁹⁰ The 2015 Pennsylvania report explains that GHGs in the atmosphere are already reaching the point that will cause an increase in temperature from pre-industrial levels, and their continued emissions will cause an increase much higher than 2°C above pre-industrial levels by mid-century.⁹¹ According to that report, "Pennsylvania has undergone a long-term warming of more than 1°C (1.8°F) over the past 110 years."⁹² It also projects an increase of about 3°C (5.4°F) between 2000 and 2050, which means that the "current warming trend is expected to continue at an accelerated rate."⁹³ As discussed below, it will be necessary to keep temperature increases well below 2°C and desirable to keep them below 1.5°C to prevent serious climate disruption.⁹⁴

84. See, e.g., NAT'L RESEARCH COUNCIL, CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS (2013), <http://www.ipcc.ch/report/ar5/wg1/>; NAT'L RESEARCH COUNCIL, CLIMATE STABILIZATION TARGETS: EMISSIONS, CONCENTRATIONS, AND IMPACTS OVER DECADES TO MILLENNIA (2011), <https://www.nap.edu/catalog/12877/climate-stabilization-targets-emissions-concentrations-and-impacts-over-decades-to>; NAT'L RESEARCH COUNCIL, ABRUPT IMPACTS OF CLIMATE CHANGE: ANTICIPATING SURPRISES (2013), <https://www.nap.edu/catalog/18373/abrupt-impacts-of-climate-change-anticipating-surprises>.

85. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, FIFTH ASSESSMENT REPORT (AR5) (2014), <http://www.ipcc.ch/report/ar5/index.shtml>.

86. See, e.g., ROYAL SOCIETY, CLIMATE CHANGE: A SUMMARY OF THE SCIENCE (2010), <https://royalsociety.org/topics-policy/publications/2010/climate-change-summary-science/>.

87. See *Coal. for Responsible Regulation, Inc.*, 684 F.3d 102; see also *Green Mt. Chrysler Plymouth Dodge Jeep v. Crombie*, 508 F. Supp. 295, 307-310 (D. Vt. 2007).

88. Pennsylvania Climate Change Act, 71 PA. CONS. STAT. § 1361.3 (2017).

89. JAMES SHORTLE, ET AL., PENNSYLVANIA CLIMATE IMPACTS ASSESSMENT UPDATE (May 2015) [hereinafter PA CLIMATE IMPACTS]. The report was required by the Pennsylvania Climate Change Act, 71 Pa. C.S. § 1361.3.

90. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 960-63 (Pa. 2013) (plurality), quoted in *Pa. Envtl. Def. Found. v. Commonwealth*, 161 A.3d 911, 916-21 (Pa. 2017).

91. See generally PA CLIMATE IMPACTS, *supra* note 89.

92. *Id.* at 6 ("Changes in Pennsylvania's temperature are reflected in other metrics, such as heating degree days (which have increased) and cooling degree days (which have decreased).").

93. *Id.* at 7.

94. See *infra* Section V.A.

This warming is, and will continue to be, accompanied by a parallel trend in increasing precipitation.⁹⁵ “The corresponding annual precipitation increase is expected to be 8%, with a winter increase of 14%.”⁹⁶ The report does not say—and could not say—that warming and precipitation trends will stabilize in 2050.⁹⁷

Climate change, the report says, will also increase air pollution and will likely make water pollution worse. On air pollution, the report states:

Climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness. The linkage between climate change and air quality is most strongly established for ground-level ozone creation during summer, but there is some evidence that higher temperatures and higher precipitation will result in increased allergen (pollen and mold) levels as well.⁹⁸

Climate change will also likely increase water pollution:

Climate change can potentially also worsen water quality, affecting health through drinking water and through contact during outdoor recreation. The two primary mechanisms through which climate change could affect surface water quality are 1) increased pathogen loads due to increased surface runoff from livestock farms, sewer overflows, and resuspension of pathogens in river sediments during heavy rainstorms, and 2) increased risk of harmful algal blooms in eutrophied lakes and reservoirs.⁹⁹

Although there may be some beneficial impacts from these changes, the Pennsylvania climate impacts report indicates that the adverse effects on Pennsylvania’s public natural resources will dwarf any positive impacts.¹⁰⁰ Higher temperatures will stress the dairy industry and require increased energy use.¹⁰¹ It will also cause forest types to change, lead to increased mortality in the forests, and interfere with forest regeneration.¹⁰² Increased temperatures may increase the prevalence of vector-borne diseases.¹⁰³ Climate change will have “a severe, negative impact on winter recreation,” so that “Pennsylvania’s downhill ski and snowboard resorts are not expected to remain economically viable past mid-century.”¹⁰⁴ Some areas will no

95. PA CLIMATE IMPACTS, *supra* note 89, at 6-7.

96. *Id.* at 7.

97. *See id.*

98. *Id.* at 11.

99. *Id.* at 11, 14. In addition, “climate change will worsen the currently substandard water quality in the tidal freshwater region of the Delaware Estuary.” *Id.*

100. *See id.*

101. *Id.* at 8.

102. *Id.* at 9-10.

103. *Id.* at 11.

104. *Id.*

longer be able to support trout.¹⁰⁵ Flood risks will increase throughout the Commonwealth.¹⁰⁶ Moreover, sea level rise will affect the Delaware estuary, inundating some areas and causing an increase in salinity.¹⁰⁷

Reports published since 2015 have determined that the adverse impacts of climate disruption on public natural resources will be more severe than those identified in the Pennsylvania climate impacts report. One more recent report indicates that sea level rise due to melting glaciers will be more extensive, such that some parts of Tinicum National Wildlife Refuge and Philadelphia International Airport will be inundated before the end of the century.¹⁰⁸ Another indicates that adverse impacts on plants and wildlife will be particularly severe, even with the emissions reductions that will be achieved under the current pledges in the Paris Agreement on climate change.¹⁰⁹ That study concluded that with the current pledges, temperatures would increase by approximated 3.2°C, reducing the ranges by more than 50% for approximately 49% of insect species, 44% of plant species and 26% of vertebrate species, and dramatically increasing their risk of extinction.¹¹⁰ With greater GHG emission reductions that would limit temperature increases to the Paris Agreement's goals of 2°C and 1.5°C, the damage will be substantially less.¹¹¹ These species, of course, include species in Pennsylvania.

Nor will the impacts of climate disruption be evenly distributed. Low income and minority communities are likely to be more severely affected because of "lack of air conditioning, greater prevalence of pre-existing health conditions, location and condition of housing, inadequate access to transportation, relatively greater rates of under-insurance, and concentrations in strenuous occupations."¹¹² In addi-

105. *Id.* at 12.

106. *Id.*

107. *Id.* at 14.

108. A study published in 2018 based on 25 years of satellite data showed accelerated rates of sea level rise driven by the melting of the Greenland and Antarctic ice sheets and predicted that, if these rates continue, sea levels would rise by 65 centimeters, or 26 inches, by 2100 compared to past estimates. R. S. Nerem et al., *Climate-change-driven Accelerated Sea-Level Rise Detected in the Altimeter Era*, 115 PROC. NAT'L ACAD. SCI. 2022, 2022 (2018), <https://doi.org/10.1073/pnas.1717312115>. The last IPCC assessment estimated that sea levels could rise from between 44 cm and 74 cm by 2100, so that the 2018 study suggests that sea level rise will be approximately two times that estimate or 109 to 139 cm, or approximately four feet. John A. Church et al., Intergovernmental Panel on Climate Change, *Sea Level Change*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, Chapter 13, at 1182, Table 13.5 (2013), <http://www.ipcc.ch/report/ar5/wg1/>. Because Tinicum marsh and the airport are located in tidal areas of the Delaware Estuary, significant portions would be inundated.

109. R. Warren et al., *The Projected Effects on Insects, Vertebrates, and Plants of Limiting Global Warming to 1.5°C Rather Than 2°C*, 360 SCIENCE 791, 791 (2018).

110. *Id.*

111. At 2°C these numbers fall to 18% of insects, 16% of plants, and 26% of vertebrates, and at 1.5°C they fall further to 6% of insects, 8% of plants, and 4% of vertebrates. *Id.*

112. Shelley Welton, *Clean Electrification*, 88 U. COLO. L. REV. 571, 627-28 (2017) (citing IPCC and other studies).

tion, because climate change will likely increase the price of water, food, and even energy, it will also disproportionately affect households with lower incomes.¹¹³

Three additional points need to be made about this information, and they all suggest that these impacts will be greater than indicated in the Pennsylvania report, the EPA's endangerment finding, and other reports. Most obviously, perhaps, these analyses are mostly silent on impacts after 2050 or any other future date. There is no scientific reason to believe that warming will stabilize by those dates; indeed, in business-as-usual scenarios, warming continues after those dates.¹¹⁴

Second, it is very likely that the impacts of climate disruption will increase over time, and that any damages occurring after 2050 will be far greater than those discussed in the Pennsylvania report and other sources. Yet many cost-benefit analyses discount costs to future generations, thus reducing these calculated future costs to an insignificant number.¹¹⁵

Third, the damage estimates in the Pennsylvania assessment and other reports tend not to account for the possibility of catastrophic climate disruption. There are potentially significant risks of catastrophic results if GHG emissions are not reduced and eliminated in a sufficiently timely manner.¹¹⁶ The end Permian mass

113. *Id.* at 628-29.

114. Nebojsa Nakicenovic & Rob Swart, *Emissions Scenarios*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, <http://www.ipcc.ch/ipccreports/sres/emission/index.php?idp=115>, (last visited Apr. 15, 2018); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014 SYNTHESIS REPORT SUMMARY FOR POLICYMAKERS 11 (2014).

115. Many ethicists question whether the cost of future climate disruption affecting future unborn generations should be discounted at all. In one of the first assessments of the ethical implications of climate change, a group of ethicists noted:

Proponents of discounting in CBA urge that the value of future environmental benefits be determined in the same way that the market applies value to future events—that is by understanding the present value of future benefits. When such discounting occurs, benefits from climate change policy options that will accrue far in the future are given little present value. Such an approach makes current investors' interests, not future generations' welfare, the focus of concern.

DONALD BROWN ET AL., WHITE PAPER ON THE ETHICAL DIMENSIONS OF CLIMATE CHANGE 29, (2006). These ethicists further concluded:

Because discounting benefits in CBA assumes only contemporary investor-individuals' interests count in determining worth, discounting techniques in CBA can violate interests of future generations to have a global climate system that has not been degraded by human activities. Since nations agreed in the adopting the UNFCCC to protect the interests of future generations, discounting benefits and harms in CBAs can violate the duty of nations to keep promises made in treaties.

Id. at 32. These concerns were more recently echoed by Pope Francis in his encyclical letter, which, without addressing discounting per se, condemned placing short term current interests ahead of the interest of future generations. *See* POPE FRANCIS, ENCYCLICAL LETTER, LAUDATO SI' OF THE HOLY FATHER FRANCIS ON CARE FOR OUR COMMON HOME 1118-1120 (2015).

116. *Massachusetts v. Env'tl. Prot. Agency*, 549 U.S. 497, 521-22 (2007)

extinction presents an extreme example of the potential high risk; 90% or more of all life on Earth died following a rapid (in geological terms) increase in carbon dioxide that occurred when volcanic action burned significant coal-bearing strata.¹¹⁷ Most analyses of the social cost of carbon, which as discussed below measures the cost of the future damages caused by emitting a ton of carbon dioxide today, fail to account for the risk of catastrophic results. For climate disruption, the probabilistic curve plotting likelihood versus damage is unusual in that it has a very long tail, representing low probability catastrophic cost possibilities.¹¹⁸ In markets, the risk of such catastrophic events suggests that, rather than discounting, we should pay a premium to prevent them, just as we pay a premium for riskier stocks over safer bonds.¹¹⁹ A model incorporating consideration of risk of catastrophic results far less significant than the end Permian mass extinction has calculated that in 2015 carbon dioxide should have been priced or taxed at about \$125 per ton.¹²⁰ The same model shows that each year that action is delayed will increase damages by \$700 billion per year “and a 15 year delay would cost roughly \$180 trillion, about six times current annual global consumption.”¹²¹

According to the climate scientist Michael MacCracken, “qualified scientific experts involved in climate change research” have reached a “strong consensus” that global warming threatens (among other things) a precipitate rise in sea levels by the end of the century, MacCracken Decl. ¶ 15, Stdg.App. 207, “severe and irreversible changes to natural ecosystems,” *id.*, ¶ 5(d), at 209, a “significant reduction in water storage in winter snowpack in mountainous regions with direct and important economic consequences,” *id.*, and an increase in the spread of disease, *id.*, ¶ 28, at 218-219. He also observes that rising ocean temperatures may contribute to the ferocity of hurricanes. *Id.*, ¶¶ 23-25, at 216-217.

Id.

See, e.g., R. B. Alley et al., *Abrupt Climate Change*, 299 SCIENCE 2005, 2008 (2016); James Hansen, et al., *Ice melt, Sea Level Rise and Superstorms: Evidence from Paleoclimate Data, Climate Modeling, and Modern Observations that 2°C Global Warming Could Be Dangerous*, 16 ATMOSPHERIC CHEMISTRY & PHYSICS 3761, 3762 (2016) [hereinafter Hansen et al., *Ice Melt*]; James Hansen et al., *Global Temperature Change*, 103 PROC. NAT'L ACAD. SCI. 14288, 14292-93 (2006); T.M.L. Wigley, *The Climate Change Commitment*, 307 SCIENCE 1766, 1767-68 (2005).

117. Raymond B. Huey & Peter D. Ward, *Hypoxia, Global Warming and Terrestrial Late Permian Extinctions*, 308 SCIENCE 398 (2005); FLANNERY, *supra* note 81 at 200-01; JAMES HANSEN, STORMS OF MY GRANDCHILDREN: THE TRUTH ABOUT THE COMING CLIMATE CATASTROPHE AND OUR LAST CHANCE TO SAVE HUMANITY 144-50 (2009) [hereinafter STORMS].

118. *See* Matthew Collins et al., *Long Term Climate Change: Projections, Commitments, and Irreversibility*, in CLIMATE CHANGE 2013: THE PHYSICAL SCIENCE BASIS, CONTRIBUTION OF WORKING GROUP I TO THE FIFTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL REPORT ON CLIMATE CHANGE 1029, 1114-19 (Sylvie Joussaume, Abdalah Mokssit, Karl Taylor, Simon Tett eds. 2013).

119. JERRY TAYLOR, THE CONSERVATIVE CASE FOR A CARBON TAX 13-15 (2015), <http://niskanecenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf>.

120. KENT D. DANIEL, ROBERT B. LITTELMAN, & GERNOT WAGNER, APPLYING ASSET PRICING THEORY TO CALIBRATE THE PRICE OF CLIMATE RISK 25 (2017) (revised draft), <https://gwagner.com/wp-content/uploads/DLW-Asset-Pricing-Climate-Risk-171113.pdf>.

121. *Id.* at 41.

B. Both the First and Second Clauses of Article I, § 27 Extend to the Natural Climate Unaffected by Climate Disruption

1. Scope of Article I, § 27

Although the climate is not expressly protected under the ERA, the ERA's language and legislative history, as well as the reasoning of both *Robinson Township* and *PEDF*, all compel the conclusion that a climate free of human disruption is protected by Article I, § 27.

The right to a natural climate unaffected by climate disruption is included within the ERA's first clause, which protects the people of Pennsylvania's right to "clean air, pure water, and to the preservation of the natural, scenic, historic and esthetic values of the environment."¹²² The Pennsylvania report indicates that a warming climate will adversely affect air quality, thus compromising the people's right to clean air.¹²³ The report also indicates that a warming climate will likely lead to greater water pollution, increased flooding, and sea level rise, thus compromising the people's right to clean water.¹²⁴

The *Robinson Township* plurality "recognize[d] that, as a practical matter, air and water quality have relative rather than absolute attributes."¹²⁵ As is the case with most other conventional water and air pollutants, carbon dioxide is a naturally occurring substance necessary for life and the maintenance of the climate, and it is only when the concentration of the pollutant becomes too high that natural processes are disrupted. For example, when the ERA recognizes a right to "pure water," this means water with levels of nutrients that support the normal functioning of aquatic ecosystems, and that conserves and maintains public natural resources, but not so high as to cause eutrophication.¹²⁶ Likewise, when the ERA recognizes a right to "clean air," it means, as applied to carbon dioxide, levels necessary to support plant life and ecosystems, among other things, but not so high as to disrupt ecosystems, as will occur in climate disruption. Similarly, "pure water" means water with levels of carbon dioxide that support the normal functioning of aquatic ecosystems, and that conserves and maintains public natural resources, but not so high as to acidify the water and disrupt those natural systems.

In addition to clean air and water, a stable climate also provides critical natural and historic values of the environment. There can be little doubt that the relatively stable climate that has persisted since the end of the last Ice Age facilitated the rise

122. PA CONST. art. I, § 27, cl. 1.

123. PA CLIMATE IMPACTS, *supra* note 89, at 132.

124. *Id.*

125. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 953 (Pa. 2013) (plurality).

126. Nitrogen compounds and phosphorus in water are necessary for supporting the plant life that supports the aquatic ecosystem, but when levels of these substances become too high eutrophication occurs and depletes oxygen, killing aquatic organisms and disrupting aquatic ecosystems are disrupted. Likewise, chromium is a heavy metal essential to life that we include in vitamin pills, but at too high a level it becomes a poison.

of civilization.¹²⁷ As the reports described above indicate, a stable climate also prevents the increasing incidence of vector-borne diseases and adverse effects from air pollution¹²⁸ and protects winter recreation.¹²⁹ The assessments discussed above also establish that climate disruption will impair scenic and esthetic values of the environment by causing dramatic changes in forests and agriculture and by reducing or eliminating key species like trout.¹³⁰

In addition, the right to a natural climate unaffected by human-caused climate disruption is included within the second clause's protection of the public's right to the conservation and maintenance of public natural resources. The *Robinson Township* plurality emphasized that the concept of public natural resources encompassed a wide range of values of the natural environment:

At present, the concept of public natural resources includes not only state-owned lands, waterways, and mineral reserves, but also resources that implicate the public interest, such as ambient air, surface and ground water, wild flora, and fauna (including fish) that are outside the scope of purely private property.¹³¹

Catastrophic climate disruption would radically impair and possibly eliminate the “wild flora, and fauna (including fish),”¹³² public forests and their ecosystems, and game and wildlife¹³³ that the plurality in *Robinson Township* expressly recognized as falling within the public trust obligations of the second and third clauses of Article I, § 27.¹³⁴

The Court in *PEDF* and the *Robinson Township* plurality both cite the ERA's legislative history as supporting a broad construction of the public natural resources that are made the property of all the people. As indicated earlier, the *Robinson Township* plurality noted:

[A]fter members of the General Assembly expressed disquietude that the enumeration of resources would be interpreted “to limit, rather than expand, [the] basic concept” of public natural resources, Section 27 was amended and subsequently adopted in its existing, unrestricted, form. The drafters seemingly signaled an intent that the concept of public natu-

127. See RICHARD ALLEY, *THE TWO-MILE TIME MACHINE: ICE CORES, ABRUPT CLIMATE CHANGE, AND OUR FUTURE* (Princeton Univ. Press 2000); STORMS, *supra* note 117, at 39-40.

128. PA CLIMATE IMPACTS, *supra* note 89, at 11.

129. *Id.* at 11-12.

130. *Id.* at 8-10 (agriculture and forestry), 12 (trout),

131. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 955 (Pa. 2013) (plurality); *accord* Pa. Envtl. Def. Found. v. Commonwealth, 161 A.3d 911, 931 (Pa. 2017).

132. *Robinson Twp.*, 83 A.3d at 955.

133. *Id.*; see also Huey & Ward, *supra* note 117 (such catastrophic climate disruption has harmed forests in the past); Alley et al., *supra* note 116; Warren et al., *supra* note 109.

134. *Robinson Twp.*, 83 A.3d at 955.

ral resources would be flexible to capture the full array of resources implicating the public interest, as these may be defined by statute or at common law.¹³⁵

The Court in *PEDF* similarly explained that the removal of the specific list and its replacement with more general language was intended to “discourage courts from limiting the scope of natural resources covered.”¹³⁶

The climate is not a private resource. Rather, the climate represents the seasonal average ranges of temperature, precipitation and other atmospheric conditions in a particular area over a long period of time.¹³⁷ Climate determines the nature of wild and other naturally occurring vegetation, fish and other wildlife; the amount and quality of ground and surface water; the characteristics of soils; the flow and extent of streams, rivers and wetlands; air quality; and most other characteristics of naturally occurring ecosystems and natural communities. These considerations all compel the conclusion that a stable climate, not disrupted by the types of changes caused by human emissions of GHGs in the atmosphere, should be understood as a public natural resource to which the people have a right and which the Commonwealth has a trustee’s duty to conserve and maintain.¹³⁸

However, under the express words of the ERA, the Commonwealth does not have a duty to “preserve” Pennsylvania’s climate unchanged.¹³⁹ Indeed, it would be impossible for the Commonwealth to do so, given the international nature of the problem and the fact that many future changes will occur because of the current levels of greenhouse gases in the atmosphere. However, as noted by the *Robinson Township* plurality, the constitutional provision uses the words “conserve and maintain,” rather than “preserve.”¹⁴⁰ This means that “the duties to conserve and maintain are tempered by legitimate development tending to improve upon the lot of Pennsylvania’s citizenry, with the evident goal of promoting sustainable development.”¹⁴¹ In further support of this proposition, the plurality cited the Montana Supreme Court’s holding that a constitutional provision providing an “inalien-

135. *Id.* (citing 1970 PA. LEGIS. JOURNAL–HOUSE at 2271–75).

136. *PEDF*, 161 A.3d at 931.

137. *Climate*, MERRIAM-WEBSTER, <https://www.merriam-webster.com/dictionary/climate> (last visited Apr. 26, 2018); see also FLANNERY, *supra* note 81 at 19–26.

138. *Cf. In re Application of Maui Elec. Co.*, 141 P.3d 1 (Haw. 2017). The case involved a challenge by citizens to a power purchase agreement with a fossil-fuel-fired power plant. The Hawai’i Constitution guarantees each person “the right to a clean and healthful environment, as defined by laws relating to environmental quality.” HAW. CONST. art. XI, § 9. The court held that the petitioners demonstrated “a threatened injury to the[ir] right to a clean and healthful environment from the effect of greenhouse gas emissions,” and thus had a right to a hearing on their claims. In other words, the right to a “clean and healthful environment” in Hawai’i includes a right to be protected against human-caused climate change.

139. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 948 (Pa. 2013) (plurality).

140. *Id.*

141. *Id.*

ble . . . right to a clean and healthful environment”¹⁴² did “not protect merely against type[s] of environmental degradation ‘conclusively linked’ to ill health or physical endangerment and animal death, but could be invoked to provide anticipatory and preventative protection against unreasonable degradation of natural resources.”¹⁴³

Finally, the public trust rights under Article I, § 27 inhere in “all the people including generations yet to come.”¹⁴⁴ Thus, the virtual certainty that effects of climate disruption will be inequitably distributed and will have greater impacts on generations yet to come¹⁴⁵ implicates Article I, § 27 even if only some people are adversely affected. As the *Robinson Township* plurality explained, disparate effects are “irreconcilable with the express command that the trustee will manage the corpus of the trust for the benefit of ‘all the people.’”¹⁴⁶ The Commonwealth’s obligation also derives from the trustee responsibility of impartiality. “Dealing impartially with all beneficiaries means that the trustee must treat all equitably in light of the purposes of the trust.”¹⁴⁷ For many reasons, the right to a natural climate unaffected by human-caused climate disruption is protected under both parts of Article I, § 27.

2. Commonwealth Duties Concerning Climate Disruption

The Commonwealth has several overall duties under Article I, § 27 concerning climate disruption. Under the first clause, the Commonwealth may not act contrary to the people’s right to a natural climate unaffected by climate disruption; “laws

142. *Id.* at 953 (citations omitted).

143. *Id.*

144. PA. CONST. art. I, § 27, cl. 2.

145. See, e.g., INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014 SYNTHESIS REPORT SUMMARY FOR POLICYMAKERS 17 (2014).

Without additional mitigation efforts beyond those in place today, and even with adaptation, warming by the end of the 21st century will lead to high to very high risk of severe, widespread and irreversible impacts globally (high confidence). Mitigation involves some level of co-benefits and of risks due to adverse side effects, but these risks do not involve the same possibility of severe, widespread and irreversible impacts as risks from climate change, increasing the benefits from near-term mitigation efforts.

Id.

See also Richard L. Revesz & Matthew R. Shahabian, *Climate Change and Future Generations*, 84 S. CAL. L. REV. 1097 (2010-2011); Kevin Clarke, *How Will Climate Change Affect the Next Generation?* U.S. CATHOLIC, Oct. 2013, at 39, <http://www.uscatholic.org/articles/201309/how-will-climate-change-affect-next-generation-27900>.

146. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 980 (Pa. 2013) (plurality).

147. *Id.* at 959. Thus, legislative decisions under which “some properties and communities will carry much heavier environmental and habitability burdens than others” are inconsistent with the obligation that the trustee act for the benefit of “all the people.” *Id.* at 1007 (using this argument to justify its decision that Section 3304 of Act 13 violates Article I, § 27).

of the Commonwealth that unreasonably impair the right are unconstitutional.”¹⁴⁸ Under the second and third clauses of the public trust provisions of Article I, § 27, the Commonwealth has two duties. One is “to prohibit the degradation, diminution, and depletion”¹⁴⁹ of a natural climate unaffected by human-caused climate disruption, whether harm to the climate results “from direct state action or from the actions of private parties.”¹⁵⁰ The other is “to act affirmatively via legislative action”¹⁵¹ to conserve the natural climate and prevent undue disruption.¹⁵² A third duty, which stems from the duty of private trust law duty of prudence, is that the Commonwealth must analyze the effect of its decisions on the public’s right to be protected against climate change prior to making them.¹⁵³

The inclusion of a right to a natural climate not disrupted by GHG pollution has three additional consequences for the Commonwealth as it interprets and applies existing statutes, regulations, and other laws. These consequences, in which Article I, § 27 plays more of a supporting role in the implementation of existing law, are based on cases decided before *Robinson Township* and *PEDF*.¹⁵⁴ The first of these involves the scope of the police power exercised by the state and local governments.¹⁵⁵ As a consequence of *PEDF*, state and local police power is constrained by a duty not to violate Article I, § 27 and an obligation to properly implement the public trust responsibilities.¹⁵⁶ These constraints and obligations apply to human-caused climate disruption. In addition, the Commonwealth has an obligation to interpret that law in a way that furthers constitutional rights when the meaning of a statute, regulation, or other law is unclear.¹⁵⁷ As a result, the Commonwealth has an obligation to interpret ambiguous laws in a way that furthers the constitutional right of people to be protected against human-caused climate change. Finally, Pennsylvania courts have previously used Article I, § 27 to support the constitutionality of laws that have been challenged on other grounds, including challenges to executive action based on claims that the action lacked sufficient statutory au-

148. *Robinson Twp.*, 83 A.3d at 951; Pa. Env’t. Def. Found. v. Commonwealth, 161 A.3d 911, 931 (Pa. 2017).

149. *PEDF*, 161 A.3d at 933.

150. *Id.*

151. *Id.*

152. *Id.*

153. *Id.* at 937 (quoting *Payne v. Kassab*, 312 A.2d 86, 94 (Pa. Commw. Ct. 1973), *aff’d* 361 A.2d 263 (Pa. 1976)).

154. Dernbach, *supra* note 5, at 150-61.

155. *Id.* at 150-56; John C. Dernbach, *The Potential Meanings of a Constitutional Public Trust*, 45 ENVTL. L. 463, 515-16 (2015).

156. Pa. Env’t. Def. Found. v. Commonwealth, 161 A.3d 911, 938 (Pa. 2017).

157. Dernbach, *supra* note 5, at 156-58; 1 PA. CONS. STAT. § 1922 (1970) (“In ascertaining the intention of the General Assembly in the enactment of a statute the following presumptions, among others, may be used: . . . 3. That the General Assembly does not intend to violate the Constitution of the United States or of this Commonwealth.”).

thorization.¹⁵⁸ It follows that legal challenges to Commonwealth actions to protect against climate disruption could be defended on the grounds that they are implementing Article I, § 27.

3. *Funk v. Wolf*

In *Funk v. Wolf*,¹⁵⁹ the plaintiffs asserted that the ERA imposed an affirmative duty on the Commonwealth to adopt and implement regulations to protect future generations from climate disruption, and that the court should grant mandamus requiring this.¹⁶⁰ The Commonwealth Court, affirmed by the Court, avoided deciding that issue. However, the Commonwealth Court appears to have assumed that prevention of climate disruption falls within the scope of Article 1, § 27's rights and duties and that the Commonwealth had a duty to promulgate regulations "to reduce CO₂ and GHG emissions" pursuant to Pennsylvania Air Pollution Control Act (APCA).¹⁶¹ The Court further acknowledged that petitioners had a right to submit a rulemaking petition to the Pennsylvania Environmental Quality Board (EQB) seeking the adoption of a specific regulation under the APCA limiting GHG emissions, and that the EQB's action with respect to that petition would be subject to judicial review.¹⁶² The EQB is the Pennsylvania entity that adopts or modifies regulations that are implemented by DEP; DEP does not have authority to adopt its own regulations.¹⁶³ As we discuss further in this article, the APCA authorizes the adoption of a regulation establishing an economy-wide cap-and-trade program with allowances distributed by auction with a reserve price. The EQB's refusal to consider such a regulation, or its adoption of an insufficiently protective regulation, could then be subject to judicial review and overturned.

The plaintiffs in *Funk* initially filed a petition with the EQB seeking the adoption of a regulation limiting GHG emissions to prevent undue climate disruption, without proposing a specific regulation or even a specific regulatory approach.¹⁶⁴ Based on DEP's representation that it was already responding to climate disruption, the EQB denied the petition.¹⁶⁵ In fact, DEP's actions were largely token ef-

158. Dernbach, *supra* note 5, at 158-61; *see, e.g.*, *Eagle Envtl. II, L.P. v. Commonwealth, Dep't of Envtl. Prot.*, 584 Pa. 494 (2005).

159. *Funk v. Wolf*, 144 A.3d 228 (Pa. Commw. Ct. 2016) *aff'd without opinion*, 158 A.3d 642 (Pa. 2017).

160. *Id.* at 232-33.

161. *Id.* at 250.

162. *Id.* at 243.

163. 71 PA. CONS. STAT. §§ 510-20 (2018).

164. Acceptance of Rulemaking Petition for Study, 43 Pa. Bull. 7095 (Dec. 7, 2013); *Funk v. Wolf*, 144 A.3d 228, 243 (Pa. Commw. Ct. 2016) *aff'd without opinion*, 158 A.3d 642 (Pa. 2017).

165. Acceptance of Recommendation, 44 Pa. Bull. 5679 (Aug. 30, 2014).

forts¹⁶⁶ falling far short of the emissions reductions necessary to prevent climate disruption.¹⁶⁷ Instead of appealing, the plaintiffs brought a mandamus action in the Commonwealth Court against the Commonwealth, the Governor of Pennsylvania, DEP and other agencies. The complaint sought declaratory relief regarding the plaintiffs' rights and the Commonwealth's duties under the ERA.¹⁶⁸ It further sought injunctive relief that would require the Commonwealth to conduct various studies.¹⁶⁹ The complaint also sought a court order requiring DEP to study, and to prepare and implement:

comprehensive regulations, in accordance with the current science, designed to account for embedded emissions and reduce carbon dioxide and other greenhouse gas emissions to safe levels and thereby reach the concentrations that must be achieved to satisfy [the Commonwealth defendants'] constitutional obligations as public trustees of the air and atmosphere.¹⁷⁰

The Commonwealth Court held that it had jurisdiction to review the decision.¹⁷¹ In so holding, it reasoned, *inter alia*, that “we would have appellate jurisdiction over a final order of the EQB denying a rulemaking petition . . . , and a final order of the Environmental Hearing Board (EHB) denying an appeal of a DEP

166. PADEP's report upon which the EQB relied in denying the petition cited a number of actions in the Department's 2009 climate plan that the Department projected would decrease emissions between the base year 2005 and 2020 by under 10 million metric tons, or less than 3.6 percent over a fifteen-year period. See PENNSYLVANIA DEP'T OF ENVTL. PROT., RECOMMENDATION TO THE PENNSYLVANIA ENVIRONMENTAL QUALITY BOARD ON THE ASHLEY FUNK PETITION FOR RULEMAKING TO REDUCE CARBON DIOXIDE EMISSIONS 13 (2014) (Figure 1), <http://files.dep.state.pa.us/PublicParticipation/Public%20Participation%20Center/PubPartCenterPortalFiles/Environmental%20Quality%20Board/2014/August%2019,%202014%20EQB%20meeting/Ashley%20Funk/1%20-%20DEP%20Recommendation.pdf>. While the Paris Agreement calls for reaching climate neutrality by the second half of this century to limit climate disruption, the rate of reduction from the 2009 Plan measures described in the Department's report would not achieve climate neutrality for over four centuries, well into the 25th century. Indeed, the Department concedes that not all of the measures in the 2009 plan had been implemented. *Id.* at 30. That report also cited a number of other actions described in the 2013 climate plan update with no projection of emissions reductions. Many of these actions were federal actions undertaken by the Obama Administration, such as the Clean Power Plan and others constituted measures to reduce increased methane emissions from the shale gas expansion in Pennsylvania. The Petitioner described these reductions as “modest” and “self-congratulatory,” “falling short of the Department's ‘constitutional obligation.’” *Id.* at 25. The Department's report fails to provide any correlation between the emissions reductions it cites and the goal of keeping temperature increases below 2°C. *Id.* at 28. In fact, that report specifically rejects the Petitioner's position that emissions should be reduced to zero by 2050. *Id.* at 38.

167. See discussion *supra* note 166.

168. Funk v. Wolf, 144 A.3d 228, 237 (Pa. Commw. Ct. 2016), *aff'd without opinion*, 158 A.3d 642 (Pa. 2017).

169. *Id.*

170. *Id.* at 238.

171. *Id.* at 241-43.

decision to not submit a rulemaking petition to the EQB. . . .”¹⁷² The Court also concluded that the plaintiffs had standing to bring the action.¹⁷³

However, the Commonwealth Court ultimately dismissed the action because it found that there was not a sufficiently express mandatory duty that would trigger the remedy of mandamus.¹⁷⁴ The Court’s decision was not premised upon an interpretation of Article I, § 27, but on the narrow scope of the remedy of mandamus:

Mandamus is an extraordinary remedy “designed to compel the performance of a ministerial act or mandatory duty, as opposed to a discretionary act. . . .” Mandamus cannot be used to direct the exercise of judgment or discretion in any particular way. . . . Nor will it issue to establish legal rights. . . . We may issue a writ of mandamus only where the petitioner has a clear legal right to enforce the performance of a ministerial act or mandatory duty, the defendant has a corresponding duty to perform the act[,] and the petitioner has no other adequate or appropriate remedy. . . .¹⁷⁵

In this regard, the Court found that the question presented in considering a writ of mandamus was not “whether the ERA imposes mandatory duties in the general sense, but whether the ERA provides . . . a clear right to the performance of the specific acts” requested and “whether the[ir] performance . . . is mandatory.”¹⁷⁶ The Court reasoned that the remedy of mandamus could not be invoked to expand the authority of executive agencies. It also explained that a judicially enforceable mandatory duty required legislation creating such a mandate, which the Court found lacking.¹⁷⁷

Although the Court’s ultimate decision was premised upon the scope of relief that could be awarded by a court under the narrow equitable writ of mandamus, the decision also relied upon the application of the three-part balancing test that unduly limited the scope of the ERA, and which the *PEDF* Court expressly rejected.¹⁷⁸ Consequently, the Commonwealth Court in *Funk* appears to have overstated the discretion afforded to both the General Assembly and the executive branch and to have understated the scope of the duties imposed by the ERA and the role of the judicial branch in enforcing those duties. It did so by effectively saying that

172. *Id.* at 243.

173. *Id.* at 248.

174. *Id.* at 251-52.

175. *Id.* at 248 (citations omitted).

176. *Id.*

177. *Id.* at 248-50.

178. Pa. Env’tl. Def. Found. v. Commonwealth, 161 A.3d 911, 930 (Pa. 2017) (rejecting three-part test because it “strips the constitutional provision of its meaning.”); *see* Funk v. Wolf, 144 A.3d 228, 234 (Pa. Commw. Ct. 2016) *aff’d without opinion*, 158 A.3d 642 (Pa. 2017).

compliance with the ERA requires executive agencies only to follow the law prescribed by the General Assembly.¹⁷⁹

Even under the unduly circumscribed three-part balancing test employed in *Funk*, the decision can be read to support the proposition that there is an enforceable duty to adopt a GHG emission regulation under the APCA, if the regulation is presented to the EQB in a detailed petition. The Commonwealth Court noted that “Respondents further acknowledge that the General Assembly, through the APCA, bestowed upon them a duty to promulgate and implement rules and regulations to reduce CO₂ and GHG emissions.”¹⁸⁰

Consequently, even in applying the unduly constrained test rejected by the Court in *PEDF*, the Commonwealth Court in *Funk* appears to conclude that the ERA creates rights and general duties, that there are specific duties for the EQB to consider a petition with an attached rule, and that there is a duty to adopt regulations addressing climate change under the APCA. The Commonwealth Court noted that if a proposal for a specific rule to address GHG emissions had been submitted to the EQB, the EHB would have had jurisdiction to review the EQB’s final action denying the petition and the Commonwealth Court would have had jurisdiction to review the order of the EHB:

While we agree that we would have appellate jurisdiction over a final order of the EQB denying a rulemaking petition . . . and a final order of the Environmental Hearing Board (EHB) denying an appeal of a DEP decision to not submit a rulemaking petition to the EQB . . . , we would not have appellate jurisdiction over the instant matter.¹⁸¹

EQB regulations prescribe a process for filing such a petition with the EQB and the EQB’s consideration of the petition.¹⁸² Following any denial of such a petition, a petitioner could bring an action for declaratory and injunctive relief.¹⁸³

179. See, e.g., *Funk*, 144 A.3d at 235 (“[T]he balance between environmental and other societal concerns is primarily struck by the General Assembly, as the elected representatives of the people, through legislative action.”).

180. *Id.* at 250. In a footnote, the Court elaborated on the source of this duty, noting that

the Commonwealth’s duties to this end derive, in part, from Section 5(a)(8) of the APCA, 35 PA. CONS. STAT. § 4004(1), which requires the EQB to adopt rules and regulations to implement the federal Clean Air Act, 42 U.S.C. §§ 7401–7671q. The United States Supreme Court, in *Massachusetts v. Envtl. Prot. Agency*, 549 U.S. 497, 528–29 (2007), had “little trouble” concluding that GHGs are “air pollutants” as defined by the Act and that the Environmental Protection Agency may regulate GHGs.

Id. at 250, n.17.

181. *Id.* at 243.

182. See 25 PA. CODE §§ 23.1–.8 (2000).

183. See *Marcellus Shale Coal. v. Dep’t of Envtl. Prot.*, 2016 Pa. Commw. Unpub. LEXIS 830 *62–63; 46 ELR 20179 (Nov. 8, 2016) (granting petition for review in part, in industry’s action for declaratory and injunctive relief with respect to newly proposed oil and gas regulations). There would

Consequently, a petitioner could ask the EQB to promulgate a rulemaking to address greenhouse gases, and any denial of such a petition would be subject to judicial review. The Court's analysis in *PEDF* only reinforces the conclusion that the Commonwealth's duty to adopt such a regulation is both mandatory and judicially enforceable.

IV. THE COMMONWEALTH'S DUTY TO PREVENT AND MITIGATE
HUMAN-CAUSED CLIMATE DISRUPTION REQUIRES THAT
PENNSYLVANIA UNDERTAKE MEASURES TO REDUCE GHG EMISSIONS
TO THE LEVEL WARRANTED BY THE SOCIAL COST OF CARBON AND TO
ACHIEVE CARBON NEUTRALITY BY MID-CENTURY

Because a stable climate not disrupted by human caused GHG emissions is a right protected under the ERA's first clause and a public natural resource for which the Commonwealth is a trustee, the ERA's text directs that the Commonwealth shall "conserve and maintain" that stable climate for "all the people, including generations yet to come."¹⁸⁴ Neither the text of the ERA nor the law of trusts provides additional guidance on concentrations of GHGs in the atmosphere that will conserve the climate, the trajectory of emissions reductions necessary to avoid exceeding that concentration, or Pennsylvania's responsibility *vis-à-vis* the rest of the world. Pennsylvania's contribution to GHG emissions exceeds that of most nations.¹⁸⁵ If states were counted as nations, Pennsylvania would have ranked as the sixteenth highest emitter in 2003.¹⁸⁶ Nevertheless, its actions alone will be insufficient to "conserve and maintain" the climate.¹⁸⁷

be no adequate remedy requiring such a petitioner to wait for PADEP to take some action that would be appealable to the Environmental Hearing Board. *See* *Arsenal Coal Co. v. Commonwealth*, 505 Pa. 198, 209-10 (1984) (Commonwealth Court erred in declining to exercise equitable jurisdiction over industry's petition to enjoin the Department of Environmental Resources from implementing or enforcing regulations promulgated by the EQB, where the internal administrative process would subject the industry to litigation and regulatory uncertainty). *A fortiori*, if there is no adequate remedy for an industry that must undertake litigation and experience regulatory uncertainty during a post-enforcement proceeding by PADEP, there is no adequate remedy for a petitioner seeking a rulemaking to address GHG emissions that is never even promulgated in the first place.

184. PA. CONST. art. I, § 27.

185. *See* Robert B. McKinstry, Jr., Adam Rose, & Coreen Ripp, *Incentive-Based Approaches to Greenhouse Gas Mitigation in Pennsylvania: Protecting the Environment and Promoting Fiscal Reform*, 14 WIDENER L.J. 205, 217 (2004) (citation omitted).

186. *Id.*

187. Pennsylvania's gross GHG emissions in 2013 totaled 305.75 million metric tons. *See* PA. DEP'T OF ENVTL. PROT., PENNSYLVANIA GREENHOUSE GAS INVENTORY 2016 4 (2016), [http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/CCAC/Docs/Inventory-2016_1-18-17_\(final\).pdf](http://files.dep.state.pa.us/Air/AirQuality/AQPortalFiles/Advisory%20Committees/CCAC/Docs/Inventory-2016_1-18-17_(final).pdf). *See also* *Massachusetts v. Env'tl. Prot. Agency*, 549 U.S. 497, 524-25 (2007). The Supreme Court rejected EPA's argument that regulation of automobile emissions in the United States, which then totaled 1.7 billion metric tons of carbon dioxide and represented "more than 6% of worldwide carbon dioxide emissions" would fail to meet the "causation" element of standing. The

Finally, the ERA does not tell us how Pennsylvania should exercise its duty to prevent climate disruption. At a minimum, one might argue that the constitutional standard requires Pennsylvania to do as much as it can, using existing authority. One can look to other sources of authority defining what is required to “conserve and maintain” a stable climate, Pennsylvania’s share of responsibility, and the means that can be employed. Specifically, as we discuss below, binding treaty law and other federal law define the temperature and concentration goals and Pennsylvania’s share. As recognized by the *Funk* decision, the APCA provides available tools for limiting emissions.¹⁸⁸ Those tools can be defined in a properly framed regulation presented by way of a petition to the EQB.¹⁸⁹ The EQB’s action on that petition can be subject to judicial review under the equitable writ of *certiorari* rather than *mandamus*.¹⁹⁰ As further described below, whether framed as the “as much as it can” standard or a standard incorporating these other sources of authority, at a minimum the mechanism should include a trading program that reduces emissions to the level warranted by the social cost of carbon and ultimately to achieve carbon neutrality by mid-century.

A. The United Nations Framework Convention on Climate Change and the Federal Clean Air Act Provide Judicially Ascertainable Standards Governing the Extent of Reductions Required to Conserve and Maintain a Stable Climate and Pennsylvania’s Relative Responsibility

A judicially ascertainable standard for determining the emissions reductions required to conserve and maintain the climate is provided by an international treaty ratified by the United States, the United Nations Framework Convention on Climate Change (UNFCCC),¹⁹¹ the Paris Agreement¹⁹² adopted pursuant to that

Court reasoned that the fact “[t]hat a first step might be tentative does not by itself support the notion that federal courts lack jurisdiction to determine whether that step conforms to law.” The Court further reasoned that “[j]udged by any standard, U.S. motor-vehicle emissions make a meaningful contribution to greenhouse gas concentrations and hence, according to petitioners, to global warming.” *Id.* at 525.

188. *Funk v. Wolf*, 144 A.3d 228, 250 n.17 (Pa. Commw. Ct. 2016), *aff’d without opinion*, 158 A.3d 642 (Pa. 2017).

189. 25 PA. CODE § 23.1.

190. *Funk*, 144 A.3d at 242-43.

191. United Nations Framework Convention on Climate Change, June 4, 1992, 1771 U.N.T.S. 107, http://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf. (providing a general framework for the international reduction of GHG emissions).

192. United Nations Framework Convention on Climate Change, *The Paris Agreement*, Dec. 12, 2015, http://unfccc.int/paris_agreement/items/9485.php [hereinafter *The Paris Agreement*]. President Trump announced his intent to withdraw the United States from the Paris Agreement. Donald J. Trump, *Statement by President Trump on the Paris Climate Accord.*, THE WHITE HOUSE (June 1, 2017), <https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/>.

However, that announcement will be ineffective with respect to Pennsylvania’s interpretation of the ERA and likely will also be ineffective with respect to federal law. First, no withdrawal can take effect until November 2020, because parties are not entitled to withdraw until three years after the Agreement

Convention, and the body of internationally-accepted scientific evidence endorsed by the nations of the world pursuant to the UNFCCC and the Paris Agreement. Pennsylvania's share of the reductions is governed by the federal Clean Air Act.¹⁹³ Under the Supremacy Clause of the United States Constitution, Pennsylvania is bound to interpret its constitution consistent with treaties which, along with the United States Constitution and federal laws, constitute the "supreme Law of the Land" that binds state courts.¹⁹⁴

The objective of the UNFCCC is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."¹⁹⁵ While the Convention does not further identify what that level is, the 2015 Paris Agreement does.¹⁹⁶ In the run-up to the

entered into force and withdrawal does not take effect until one year after the withdrawal. *The Paris Agreement*, art. 28. Second, the Paris Agreement merely interprets the UNFCCC, from which the United States has not withdrawn, and which remains therefore binding law under Article III of the Constitution. Finally, the pertinent requirements of the UNFCCC as interpreted by the UNFCCC are likely now customary international law that will be binding on the United States and its states notwithstanding the United States' withdrawal. Robert B. McKinstry, Jr., Thomas D. Peterson & Steven Chester, *Unlocking Willpower Part Two*, 47 ENVTL. L. REP. 10135, 10137-38 (2017); see also Robert B. McKinstry, Jr., *What Really Happened? Implications of President Trump's Announcement on U.S. Withdrawal From the Paris Agreement and the Law of Unintended Consequences*, BALLARD SPAHR (July 2017) at 1-2, https://response.ballardspahr.com/email_handler.aspx?sid=5427bed1-f563-45e1-8cb1-74758039dace&redirect=http%3a%2f%2fwww.ballardspahr.com%2f%7e%2fmedia%2fFiles%2fArticles%2fWhat_Really_Happened (It is important to note that even if the Paris Agreement's definition of the intent of the UNFCCC to prevent "dangerous anthropogenic interference with the climate system" should not be considered binding law, the international scientific consensus reflected in the Paris Agreement can equally define the emissions reductions required to fulfill the Commonwealth's duty as a trustee to conserve and maintain a stable climate.).

193. See generally Clean Air Act, 42 U.S.C. §§ 7401-7671 (2012).

194. See U.S. CONST. art. VI, cl.2. The *Charming Betsy* doctrine, requiring that federal law be construed consistent with the "law of nations," should be equally binding with respect to the interpretation of state constitutional law. *Murray v. Schooner Charming Betsy*, 6 U.S. 64, 118 (1804).

195. UNFCCC, *supra* note 191, art. 2.

196. *The Paris Agreement*, *supra* note 192, art. 2, § 1.

This Agreement, in enhancing the implementation of the Convention, including its objective, aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by: . . . (a) Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.

Id. See also *id.* art. 4 § 1.

In order to achieve the long-term temperature goal set out in Article 2, Parties aim to reach global peaking of greenhouse gas emissions as soon as possible, recognizing that peaking will take longer for developing country Parties, and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.

Id.

Paris Conference, the Conference of the Parties translated the Framework Convention's stabilization objective into a maximum permissible surface temperature increase. The most frequently stated goal was 2°C (or 3.6° F) above pre-industrial levels.¹⁹⁷ Reflecting the evolving scientific consensus on the temperature rise at which serious climate disruption will occur, the Paris Agreement aims to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels."¹⁹⁸ The parties also agreed "to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change."¹⁹⁹

Also reflecting the scientific consensus of the nations of the world, the Paris Agreement further defines the emissions reductions required to keep temperatures below those thresholds by requiring that the Parties "achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century."²⁰⁰ If the entire world needs to reach a point where emissions of GHGs are no greater than their removal by GHG sinks by the second half of this century, Pennsylvania will also need to achieve that balance by that time. Therefore, at a minimum, Pennsylvania must develop an emissions reduction trajectory that reduces net emissions to zero, meaning the elimination of all GHG emissions other than those geologically or biologically returned to sinks (*i.e.* sequestered) by the second half of the 21st century. Because Pennsylvania's GHG emissions are disproportionately higher than most of the rest of the world, Pennsylvania should achieve that goal by mid-century.

This goal furthers the UNFCCC requirement that the developed nations take the lead in reducing emissions, enacting policies to limit emissions, and enhance carbon sinks.²⁰¹ These policies are to be precautionary, comprehensive and "cost-effective so as to ensure global benefits at the lowest possible cost . . . and comprise all economic sectors."²⁰² There is a scientific consensus, reflected in a growing

197. See, e.g., United Nations Framework Convention on Climate Change, *Report of the Conference of the Parties on its Sixteenth Session, Held in Cancun from 29 November to 10 December 2010*, ¶ 4, U.N. Doc. 1/CP.16, FCCC/CP/2010/7/Add.1 (Mar. 15, 2011), <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf>.

198. United Nations Framework Convention on Climate Change, *Conference of the Parties, Decision 1/CP.21, art. 2.1(a)*, U.N. Doc. FCCC/CP/2015/L.9/Rev.1 (2015), <https://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf>.

199. *Id.*

200. *Id.* art. 4, § 1.

201. UNFCCC, *supra* note 191, art. 3, § 1; art. 3 § 3; art. 4, § 2(a); *The Paris Agreement, supra*, note 192, art. 4, § 4.

202. UNFCCC, *supra* note 191, art. 3, § 3; see *The Paris Agreement, supra* note 192, art. 4, § 4 (requiring the United States and other developed country parties to take the lead in achieving the necessary reductions); UNFCCC, *supra* note 191, art. 4, § 2(a) (calling for the adoption of "policies and take corresponding measures on the mitigation of climate change, by limiting its anthropogenic emissions of greenhouse gases and protecting and enhancing its greenhouse gas sinks and reservoirs"); UNFCCC, *supra* note 191, art. 3, § 2 (requiring each nation to consider impacts beyond those within its borders,

number of state and local emissions reduction goals, that developed nations need to reduce their total economy-wide emissions by at least 80% from 1990 levels by 2050.²⁰³ Moreover, a growing number of studies, including a study by the World Bank, have concluded that this goal is achievable.²⁰⁴

The provisions of the federal Clean Air Act governing the obligations of states support the proposition that Pennsylvania should consider these treaty obligations in construing its obligations as a trustee under Article I, § 27. Section 115 of the Clean Air Act is triggered whenever the EPA finds air pollution originating within a state “cause[s] or contribute[s] to air pollution which may reasonably be anticipated to endanger public health or welfare in a foreign country.”²⁰⁵ When that happens, the EPA must require the state to submit an amendment to the “good neighbor” provision of its state implementation plan²⁰⁶ that will “prevent or eliminate the endangerment.”²⁰⁷ In its endangerment finding, EPA found that emissions of GHGs within the United States endanger health and the environment in other nations.²⁰⁸ Virtually all other nations of the world are parties to the

considering “the specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change”).

203. Cal. Exec. Order No. B-30-15 (Apr. 29, 2015), <https://www.gov.ca.gov/2015/04/29/news18938/>; Conn. Exec. Order No. 46 P1 (2015); Colo. Exec. Order No. D 004 08 § 1 (Apr. 22, 2008); MASS. GEN. LAWS ch. 21N, § 3(b)(4); Mich. Exec. Dir. 2009-4 Section II; 2015 Minn. Laws 216H.02 subd 1; N.J. STAT. ANN. § 26:2C-38 (West 2009); N.Y. Exec. Order No. 24 (2009), <https://www.dec.ny.gov/energy/71394.html>; 42 R.I. GEN. LAWS § 42-6.2-2(a)(C) (2014).

204. MARIANNE FAY ET AL., INT’L BANK FOR RECONSTRUCTION AND DEV./THE WORLD BANK, DECARBONIZING DEVELOPMENT: THREE STEPS TO A ZERO-CARBON FUTURE 96 (2015), <http://www.worldbank.org/content/dam/Worldbank/document/Climate/dd/decarbonizing-development-report.pdf>; JEFFREY SACH, ET AL., SUSTAINABLE DEVELOPMENT SOLUTIONS NETWORK AND THE INST. FOR SUSTAINABLE DEV. AND INT’L RELATIONS, PATHWAYS TO DEEP DECARBONIZATION IX (Emmanuel Guérin, et al. eds. 2014), http://unsdsn.org/wp-content/uploads/2014/09/DDPP_Digit_updated.pdf; see also John C. Dernbach, *Creating Legal Pathways to a Zero Carbon Future*, in CONTEMPORARY ISSUES IN CLIMATE CHANGE LAW AND POLICY: ESSAYS INSPIRED BY THE IPCC 21 (Robin Kundis Craig & Stephen R. Miller eds. 2016).

Because the endpoint will be carbon neutrality, this will be required of Pennsylvania under any scenario.

205. 42 U.S.C. § 7415(a) (2016).

206. 42 U.S.C. § 7410(a)(2)(H)(ii) (2016).

207. *Id.* § 7415(b) (2015).

208. Endangerment Finding, *supra* note 82, at 66,514 (The EPA made the finding in connection with its determination that the impacts of climate change in foreign nations would, in turn, endanger health and welfare within the United States:

EPA is not considering international effects to determine whether the health and welfare of the public in a foreign country is endangered. Instead, EPA’s consideration of international effects for purposes of determining endangerment is limited to how those international effects impact the health and welfare of the U.S. population);

Id. The precise nature of the Administrator’s finding regarding international effects is set forth in the proposed finding, which the Administrator adopted in the final action:

UNFCCC and the Paris Agreement, which provides the United States reciprocal rights with respect to the prevention and control of greenhouse gases.²⁰⁹ These facts trigger the obligation to reduce GHG emissions to prevent endangerment in

On a global basis, according to the IPCC, projected climate change-related impacts are likely to affect the health of millions of people, particularly those with low adaptive capacity, as a result of a number of factors including increased cardio respiratory diseases due to higher concentrations of groundlevel ozone brought on by higher temperatures, and by more frequent and intense heat waves. Food production is expected to be much more vulnerable to climate change in poorer regions of the world compared to food production in the U.S. The IPCC also identified that the coasts around the world are experiencing the adverse consequences of hazards related to climate and sea level. Coastal settlements are highly vulnerable to extreme events, such as storms which impose substantial costs on coastal societies. Ecosystems and species around the world are very likely to show a wide range of vulnerabilities to climate change, depending on the extent to which climate change alters conditions that could cross critical thresholds. The most vulnerable ecosystems include coral reefs, sea-ice ecosystems, high-latitude boreal forests, and mountain ecosystems where there is no possibility of migrating to adapt to climate change.

Climate change impacts in certain regions of the world may exacerbate problems that raise humanitarian, trade and national security issues for the U.S. Climate change has been described as a potential threat multiplier regarding national security issues. This is because, as noted above, climate change can aggravate existing problems in certain regions of the world such as poverty, social tensions, general environmental degradation, and conflict over increasingly scarce water resources.

Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act, 74 Fed. Reg. 18886, 18903 (Apr. 24, 2009). Although the Administrator stated that she was not making a foreign endangerment finding, these factual determinations regarding effects in foreign nations underlying her determination that these effects would cause endangerment in the United States effectively constitute a finding that GHG emissions in the United States cause or contribute to endangerment in other nations.

209. See *Status of Ratification of the Convention*, UNITED NATIONS, <https://unfccc.int/process/the-convention/what-is-the-convention/status-of-ratification-of-the-convention> (196 nations and 1 regional economic integration organization are Parties) (last visited Apr. 17, 2018); *UNFCCC Status as of 17-04-2018*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=IND&mtmsg_no=XXVII-7&chapter=27&Temp=mtmsg3&clang=_en (last visited July 9, 2018); *Paris Agreement – Status of Ratification*, UNITED NATIONS, <https://unfccc.int/process/the-paris-agreement/status-of-ratification> (175 Parties have ratified of 197 Parties to the Convention) (last visited Apr. 17, 2018); *Paris Agreement Status as at 17-04-2018*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtmsg_no=XXVII-7-d&chapter=27&clang=_en (last visited July 4, 2018). See *The Paris Agreement* art. 2 § 1 (a), art. 3, art. 4 § 1 (Article 3 of the Paris Agreement calls for all Parties “to undertake and communicate ambitious efforts” as defined further in the Agreement “with the view to achieving the purpose of the Agreement as set out in Article 2,” viz. limiting GHG emissions to hold “the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels” by achieving net emissions neutrality by the second half of the century. Thus, there are reciprocal rights and obligations to reduce emissions among the 175 parties to the Agreement.). See generally Michael Burger et. al., *Legal Pathways to Reducing Greenhouse Gas Emissions Under Section 115 of the Clean Air Act*, UCLA School of Law, Public Law Research Paper No. 16-11 (Jan. 2016), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2742366.

other nations within the meaning of section 115.²¹⁰ Further, the Clean Air Act's good neighbor provision requires that each state implementation plan include "adequate provisions . . . insuring compliance with the requirements of section . . . [115] of this title (relating to . . . international air pollution)."²¹¹ Although EPA has not issued a call for states to submit state implementation plans (SIPs) to reduce GHG emissions under section 115, the predicates triggering the mandatory obligation to do so exist. Thus, Pennsylvania's obligations under the Clean Air Act's good neighbor provision also exist. These create an obligation for Pennsylvania, as a fiduciary under the ERA, to take action to reduce emissions to prevent endangerment of foreign nations from GHG pollution consistent with the good neighbor provision.

B. Pennsylvania's Obligation as a Trustee Should Require that GHG Emissions Be Limited to the Extent Consistent with the Social Cost of Carbon and to Achieve Carbon Neutrality by Mid-Century

A regulatory program that is designed to take all measures reasonably necessary to conserve the corpus of the environmental trust resource for the benefit of the trust's beneficiaries will most closely hew to the intent and text of the ERA as interpreted in *PEDF* and the *Robinson Township* plurality. That program should therefore employ all measures reasonably necessary to conserve a stable climate and the public environmental resources it supports. As explained further below, this can be best accomplished by putting a price on emissions of GHGs at least equal to the social cost of carbon and by recovering the value of that emissions price as income for the beneficiaries of the trust. We will explain below the derivation of this "social cost of carbon" and its relevance to Pennsylvania's constitutional obligations as a trustee under the ERA.

1. The Relationship of the Social Cost of Carbon to Pennsylvania's Obligations as a Trustee

In economic theory, the impacts of climate disruption represent "externalities" of the emissions of GHGs that are not reflected in the market price of the products whose manufacture produces those emissions.²¹² Under that theory, those who emit GHGs are appropriating the resources they damage without paying for the damage. Principles of economic efficiency, as well as equity, require that those responsible for the damage pay for it and that the damage be reflected in the price of the

210. See *Her Majesty the Queen in Right of Ontario v. Env'tl. Prot. Agency*, 912 F.2d 1525, 1528 (D.C. Cir. 1990); see also *McKinstry, Peterson & Chester*, *supra* note 192, at 10142.

211. 42 U.S.C. § 7410(a)(2)(D)(ii) (2012).

212. NAT'L RESEARCH COUNCIL, HIDDEN COSTS OF ENERGY: UNPRICED CONSEQUENCES OF ENERGY PRODUCTION AND USE 28-29 (2010).

goods whose manufacture will cause the damage. If the cost of reducing emissions is less than the cost of the damages avoided, the emitter will reduce the emissions, creating a net increase in social welfare; the market will therefore favor activities that do not emit the GHGs that cause the damage.²¹³ The social cost of carbon is a measure of the future estimated cost or damage resulting from the emission of a metric ton of carbon today; imposing that cost on carbon emissions today will shift economic activity to other activities that do not result in that cost or damage.²¹⁴

There have been a number of efforts to calculate this social cost of carbon. Because a series of Executive Orders required that federal agencies prepare cost-benefit analyses to assess the impact of regulatory actions, the United States convened an interagency task force to determine this social cost of carbon, producing reports in 2010 and 2016.²¹⁵ Based on updated data on the damages caused by climate disruption, the 2016 report calculated a variety of values representing the average and high cost of GHG emissions for different time periods and discount rates.²¹⁶ As action is delayed, the social cost of carbon increases because the damage

213. *Id.* at 32; see McKinstry, Rose, & Ripp, *supra* note 185, at 214-221; see also SAMUEL A. NEWELL ET AL., N.Y. DEP'T. OF PUB. SERV., N.Y. INDEP. SYS. OPERATOR, PRICING CARBON INTO NYISO'S WHOLESALE ENERGY MARKET TO SUPPORT NEW YORK'S DECARBONIZATION GOALS 3 (2017), https://www.energymarketers.com/Documents/Brattle_study_carbon_pricing.pdf.

214. NAT'L RESEARCH COUNCIL, *supra* note 212, at 60.

215. See Regulatory Planning & Review, 58 Fed. Reg. 51,735 (Sept. 30, 1993) (requiring agencies, to the extent permitted by law, "to assess both the costs and the benefits of the intended regulation and, recognizing that some costs and benefits are difficult to quantify, propose or adopt a regulation only upon a reasoned determination that the benefits of the intended regulation justify its costs"); INTERAGENCY WORKING GRP. ON SOC. COST OF CARBON, TECHNICAL SUPPORT DOCUMENT: SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 (2010), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/scc_tsd_2010.pdf; INTERAGENCY WORKING GRP. ON SOC. COST OF GREENHOUSE GASES, TECHNICAL SUPPORT DOCUMENT: TECHNICAL UPDATE OF THE SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866 (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/sc_co2_tsd_august_2016.pdf [hereinafter 2016 SCC]; INTERAGENCY WORKING GRP. ON SOC. COST OF GREENHOUSE GASES, ADDENDUM TO TECHNICAL SUPPORT DOCUMENT ON SOCIAL COST OF CARBON FOR REGULATORY IMPACT ANALYSIS UNDER EXECUTIVE ORDER 12866: APPLICATION OF THE METHODOLOGY TO ESTIMATE THE SOCIAL COST OF METHANE AND THE SOCIAL COST OF NITROUS OXIDE (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf. See Presidential Order on Promoting Energy Independence and Economic Growth, 82 Fed. Reg. 16,093 (Mar. 31, 2017). President Trump has issued an Executive Order directing the withdrawal of the social cost of carbon guidance. However, that Order has no binding legal effect standing alone and there are cogent reasons to believe that, if it were applied, that application would not withstand judicial review. The guidance represented the peer-reviewed consensus of a group of scientific and economic experts. The conclusions can no more be undone by unilateral executive fiat than can the conclusions of any other expert report.

216. 2016 SCC, *supra* note 215, at 4.

is greater, more imminent, discounted less.²¹⁷ The 2016 report calculated that the average social cost of carbon in 2020 (using a discount rate of 3%) is \$42/ton, but that the 95th percentile (high) cost would be \$123/ton. In 2050, these figures increase to \$69/ton and \$212/ton.²¹⁸ These costs represent the marginal cost of avoiding future damage from the emission of a ton of carbon in any given year and they, therefore, do not include the damage that will already occur as a result of past emissions.²¹⁹

Federal agencies, states, and federal courts have relied upon the social cost of carbon in determining which measures should be employed to prevent GHG emissions. Prior to 2017, federal agencies routinely relied upon the social cost of carbon developed by the expert panel in cost-benefit analyses.²²⁰ The Seventh Circuit spe-

217. See ENVTL. PROT. AGENCY, FACT SHEET, SOCIAL COST OF CARBON 2 (2016), https://19january2017snapshot.epa.gov/sites/production/files/2016-12/documents/social_cost_of_carbon_fact_sheet.pdf [hereinafter EPA SCC FACT SHEET].

218. 2016 SCC, *supra* note 215, at 4, Table ES-1.

Bob Litterman, one of the world's leading economists on pricing risk suggests that the failure of the calculations of the social cost of carbon to incorporate high damage-low probability events results in a lower cost estimates and emphasizes that delay in mitigation by fifteen years will triple the social cost of carbon. Bob Litterman, Kent Daniel & Gernot Wagner, Applying Asset Pricing Theory to Calibrate the Price of Climate Risk 43 (Mar. 15, 2017), https://globalriskinstitute.org/wp-content/uploads/2017/05/GRI_Asset-Pricing-Climate-Risk_Mar-15-2017-Litterman.pdf.

219. EPA SCC FACT SHEET, *supra* note 217, at 1 ("The SC-CO2 is a measure, in dollars, of the long-term damage done by a ton of carbon dioxide (CO2) emissions in a given year. This dollar figure also represents the value of damages avoided for a small emission reduction (*i.e.*, the benefit of a CO2 reduction).")

220. For example, the EPA SCC Fact Sheet that accompanied the release of the 2016 SCC gave the following examples of EPA's use of the SCC in rulemakings:

EPA has used the interagency group recommended estimates of the SC-CO2 to analyze the carbon dioxide impacts of various rulemakings since 2010. Examples of these rulemakings include:

- The Joint EPA/Department of Transportation Rulemaking to establish Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards (2012-2016)
- Amendments to the National Emission Standards for Hazardous Air Pollutants and New Source Performance Standards (NSPS) for the Portland Cement Manufacturing Industry
- Regulatory Impact Results for the Reconsideration Proposal for National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters at Major Sources
- Proposed National Emission Standards for Hazardous Air Pollutants (NESHAP) for Mercury Emissions from Mercury Cell Chlor Alkali Plants
- Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Commercial and Industrial Solid Waste Incineration Units Standards
- Final Mercury and Air Toxics Standards

cifically approved this use of that social cost of carbon in promulgating energy efficiency regulations in *Zero Zone v. Department of Energy*.²²¹ Both Illinois and New York relied upon the federally-determined social cost of carbon in the development of zero emissions credit (ZEC) programs to “encourage the preservation of the environmental values or attributes of zero-emissions nuclear-powered electric generating facilities for the benefit of the electric system, its customers and environment.”²²² These programs provide assurances that the electricity generators will receive value equivalent to the avoided cost of carbon emissions calculated using the federal social cost of carbon.²²³ Federal district courts have rejected a variety of challenges to both state programs.²²⁴

Although President Trump has issued an Executive Order withdrawing the federal social cost of carbon,²²⁵ that action should not preclude state reliance on the expert determinations underlying that metric. It is also doubtful that the President can reverse the determination of a panel of scientific experts by administrative fiat, particularly where regulations based on the scientific determination have been upheld on judicial review and the derivation of the metric is consistent with principles of international law.²²⁶

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- Joint EPA/Department of Transportation Rulemaking to establish Medium- and Heavy- Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards
 - Proposed Carbon Pollution Standard for Future Power Plants
 - Joint EPA/Department of Transportation Rulemaking to establish 2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards.

EPA SCC FACT SHEET, *supra* note 217, at 4-5.

221. *Zero Zone v. Dep’t of Energy*, 832 F.3d 654, 677 (7th Cir. 2016).

222. *Coal. for Competitive Elec. v. Zibelman*, 272 F. Supp. 3d 554, 561 (S.D.N.Y. 2017), *appeal filed* (2d Cir. Aug. 25, 2017) (quoting CES Order, app. E, at 1).

223. *Id.* at 562. Specifically, “the price of each ZEC is the social cost of carbon less the generator’s putative value of avoided greenhouse gas emissions less the amount of the forecast energy price.” *Id.*

224. *Vill. of Old Mill Creek v. Star*, 2017 WL 3008289, No. 17 CV 1163 and 1164 (N.D. Ill. July 14, 2017) (upholding Illinois program); *Zibelman*, 272 F. Supp. at 561 (upholding New York program). Although both programs are under appeal, the use of the federal social cost of carbon is not an issue in those appeals.

225. *See* Exec. Order No. 13,783, 82 Fed. Reg. 16,093 (Mar. 31, 2017).

226. The action is reminiscent of the apocryphal story of King Canute’s attempt to hold back the tides cited in *Diamond v. Chakrabarty*, 447 U.S. 303, 317 (1980). The Regulatory Impact Statement supporting EPA’s proposal to withdraw the Clean Power Plan uses a much lower social cost of carbon based on a limitation of consideration of damages to those that will occur only within the United States. This appears to be directly contrary to the UNFCCC’s principle applicable to all parties set forth in Article 3, Section 3 directing that rules “should be cost-effective so as to ensure global benefits at the lowest possible cost.” In other words, cost-effectiveness should consider global benefits in the form of reduced global damages rather than limiting that consideration to the benefits accruing to an individual nation or, in the case of Pennsylvania, state.

The social cost of carbon has several implications with respect to the Commonwealth's duties as a trustee under the reasoning of *Robinson Township* and *PEDF*. First, allowing emissions to continue unabated will increase the damage to the corpus of the trust.²²⁷ If a price is put on the emissions equal to the social cost of carbon, or emitters are otherwise required to implement all emissions reductions up to that cost, the damage to the corpus of the trust will be avoided consistent with the duty to "conserve and maintain" the trust corpus. Second, the social cost of carbon provides a way of measuring the cost of damage from climate change, including damage to public natural resources, through state actions allowing unregulated emissions of GHGs. Third, the Commonwealth's duty to "act affirmatively via legislative action to protect the environment,"²²⁸ suggests that the state could use a mechanism like the social cost of carbon to constrain the emissions of GHGs that harm public natural resources. This result seems compelled by the text of the ERA and the trustee's duty of prudence as found by the Court in *PEDF*.²²⁹

While the social cost of carbon is based on the marginal cost of greenhouse gas emissions based on global damages, the ERA relates to the public natural resources of the Commonwealth of Pennsylvania. The most relevant public natural resource, a stable climate not disrupted by human GHG pollution, is both a global resource and a Pennsylvania public resource. If a cost is put on GHG emissions, as contemplated by the derivation of the social cost of carbon, parties will implement all control measures that cost less than the social cost of carbon, so that the social cost of carbon represents the cost that should be imposed to prevent "unreasonable degradation of natural resources."²³⁰ A lower cost will be insufficient to conserve the global resource, and if the global climate is disrupted, Pennsylvania's climate will be equally disrupted.²³¹ Because GHGs are global pollutants, if Pennsylvania does not implement all measures costing less than the social cost of carbon, but instead uses some lesser value based on the damage within Pennsylvania itself, the global climate will be disrupted, and Pennsylvania trust resources will neither be conserved nor maintained.

There is a second legal reason for employing a measure based on the marginal global cost associated with a ton of GHGs. The UNFCCC requires that developed

227. See *supra* Section III.A.

228. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 958 (Pa. 2013) (plurality); *Pa. Env'tl. Def. Found. v. Commonwealth*, 161 A.3d 911, 933 (Pa. 2017).

229. See *PEDF*, 161 A.3d at 932 (citation omitted); see also *id.* at 938 (invalidating transfer of funds because it violated the duty of prudence and the duty to use trust assets in accordance with the trust purposes). Whether the Commonwealth's failure as a trustee to preserve the corpus of the trust resources after damage may have created liability for damage is beyond the scope of this article.

230. See *Robinson Twp.*, 83 A.3d at 953 (quoting *Mont. Env'tl. Info. Ctr. v. Dep't of Env'tl. Quality*, 988 P.2d 1236, 1249 (1999)).

231. An argument premised on the proposition that one should ignore the global marginal cost of the emissions of a ton of GHGs in calculating the social cost of carbon would be the equivalent of arguing that one should ignore global demand and cost considerations in valuing the price of oil.

nations implement policies and measures to deal with climate change that “should be cost-effective so as to ensure global benefits at the lowest possible cost.”²³² In this case, the “global benefits” are the avoided global damages measured by the social cost of carbon. For this reason, the social cost of carbon appears to be the best measure to determine both the value of the undisrupted climate resources and the scope of measures required under the ERA to prevent unreasonable degradation of those resources.

2. Support for a Meaningful Price on GHG Emissions

The APCA authorizes the EQB to adopt a regulation putting a price on GHG emissions commensurate with the social cost of carbon and establishing a descending cap that achieves carbon neutrality by mid-century. The *PEDF* decision provides additional support for such a regulation through two overlapping rationales. First, there is a significant argument that allowing private parties to emit GHGs is the equivalent of allowing them to appropriate ecosystem services for free even though the Commonwealth has a fiduciary duty to assure that the beneficiaries of the trust obtain a fair price. Allowing the use of these resources without requiring payment would arguably loot public trust resources in an even more egregious way than the General Assembly’s looting in *PEDF*. Second, putting a price on emissions commensurate with the social cost of carbon and establishing a descending cap that achieves carbon neutrality by mid-century is necessary to sufficiently maintain and conserve the ERA trust resources.²³³ Both rationales would support either the imposition of a fee or capping emissions and auctioning allowances with a reserve price that is adequate both to (1) assure the conservation of the trust resources by limiting the risk to those resources and (2) compensate the Commonwealth for the damage to public resources that will occur. In either case, the required price would be at least as great as the social cost of carbon, which, as discussed above, is based on the marginal cost of the future damage avoided by each ton of carbon dioxide emitted.²³⁴

Putting a price on carbon consistent with the social cost of carbon under each of the foregoing rationales is arguably mandated by the fiduciary duties cited by the Court in *PEDF*. These duties include the duty of prudence, which “requires a trustee to ‘exercise such care and skill as a man of ordinary prudence would exercise in dealing with his own property.’”²³⁵ A prudent trustee would seek to use an

232. UNFCCC, *supra* note 191, art. 3, § 3.

233. Because, as discussed above, the social cost of carbon should be set at a level reflecting the damages avoided by not emitting an additional ton of carbon dioxide, with a premium reflecting the risk of catastrophic results and uncertainty, emissions will be avoided as long as the value from emitting the carbon dioxide is greater than the damage with the risk premium.

234. See EPA SCC FACT SHEET, *supra* note 217, at 1.

235. *PEDF*, 161 A.3d at 932 (quoting *In re Mendenhall*, 398 A.2d 951, 953 (Pa. 1979) (quoting RESTATEMENT (SECOND) OF TRUSTS § 174).); see also *id.* at 938.

effective means of protecting the trust corpus; the effectiveness of a carbon price for this purpose is supported by both theory and experience. Putting this price on carbon emissions is also consistent with the text of the ERA, which directs the Commonwealth, as trustee, to “conserve and maintain” the trust corpus in furtherance of the people’s enumerated rights. Requiring polluters to purchase at auction their right to pollute the air, subject to a reserve price equal to the avoided damage as represented by the social cost of carbon, is more consistent with the Commonwealth’s duties as a trustee for its natural resources than allowing those polluters to appropriate those public resources free of charge and, as a result, deplete or damage the corpus of the trust.

V. A REGULATORY STRUCTURE AUTHORIZED BY EXISTING LAW CAN ACHIEVE CARBON NEUTRALITY BY MID-CENTURY AND IMPOSE THE SOCIAL COST OF CARBON ON GHG EMISSIONS

As suggested by *Funk v. Wolf*,²³⁶ individuals adversely affected by climate disruption could assert their right under Article I, § 27 to have the Commonwealth perform its duty as a trustee to prevent climate disruption by submitting a petition to the EQB seeking the promulgation of specific regulations limiting GHG emissions pursuant to the APCA.²³⁷ The petition must include a proposed regulation or regulatory structure consistent with existing statutory authority.²³⁸ That authority would need to support a court order compelling the regulation’s adoption should the EQB fail to act, and withstand judicial review if the regulation were adopted by the EQB. To accomplish this, the structure should satisfy the following criteria:

- First, as discussed above, the regulatory structure should result in the reduction of emissions sufficient to achieve net carbon neutrality by the second half of the century, if not earlier.
- Second, as also discussed above, the regulatory structure should either impose a cost on emissions equal to the social cost of carbon or require all emissions reduction measures less than that cost. The structure could start with a lower cost that grows steadily over time, creating consistency with other programs, generating a predictable framework for investment decisions and facilitating a transition from free emissions to emissions that incur a cost.
- Third, as also discussed above, the structure should generate income for the beneficiaries of the trust without impairing the trust’s principal.

236. *Funk v. Wolf*, 144 A.3d 228, 243 (Pa. Commw. Ct. 2016), *aff’d without opinion* 158 A.3d 642 (Pa. 2017).

237. 35 PA. CODE §§ 4001-4015 (2011).

238. *See* 25 PA. CODE §§ 23.1(a)(2)(i), 2(2) (2011).

- Fourth, as discussed below, the regulatory structure should result in actual emissions reductions and not result in the transfer of emissions to other unregulated economic sectors, states or nations through the process of leakage.
- Finally, as suggested in *Funk*, the regulatory structure should be authorized by existing law, or it should be authorized by law that can be implemented administratively without further legislation.²³⁹

For the reasons discussed below, other measures may be warranted to reduce the cost and effectiveness of a program. However, these criteria support and arguably require the adoption of an economy-wide cap-and-trade program with an auction and reserve price, similar to the program established under the California Global Warming Solutions Act.²⁴⁰ The regulation should prevent intersectoral “leakage” as well as leakage to other states and nations. The requirements of the ERA support distribution of the tradable allowances through an auction with a reserve price set at the social cost of carbon, except in instances where the award of free allowances or low-cost allowances may be warranted to prevent leakage. The program should be designed to effectively prevent leakage and inefficiencies by allowing interstate and international trading with jurisdictions with similar programs.

Existing Pennsylvania statutes authorize both the regulation of GHG emissions and participation in regional cap-and-trade programs, such as the nine-state Regional Greenhouse Gas Initiative (RGGI) or the California-Quebec-Ontario trading program. “RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO₂ emissions from the power sector.”²⁴¹ New Jersey is preparing to rejoin RGGI and Virginia has proposed regulations that

239. See *Funk*, 144 A.3d at 250 (noting that “[b]ecause the ERA does not authorize Respondents to disturb the legislative scheme, we must assess whether the actions requested are otherwise made mandatory by the climate change legislative scheme.”). This assumes that the General Assembly remains unwilling to enact new legislation and that it will be necessary to induce or judicially compel administrative action. The State of New York has been proceeding to implement its program for reducing GHGs administratively, using executive authority. See *Thrun v. Cuomo*, 976 N.Y.S.2d 320, 323 (N.Y. App. Div. 2013) (dismissing claims against New York Governor’s climate change action on jurisdictional grounds, limiting claims to challenges to regulations); *Coal. for Competitive Elec. v. Zibelman*, 272 F. Supp. 3d 554, 559 (S.D.N.Y. 2017), *appeal filed* (2d Cir. Aug. 25, 2017) (quoting CES Order, app. E, at 1).

240. See CAL. HEALTH & SAFETY CODE §§ 38500-38599 (West 2006); CAL. CODE REGS., tit. 17, §§ 95801-96022 (2018). These regulations were changed in 2016 to set more aggressive targets. We are suggesting that the basic structure of the regulatory program — economy wide applicability with an auction and reserve price — should be adopted by Pennsylvania, not necessarily the goals. Pennsylvania goals should be structured to provide a longer term and certain path to carbon neutrality by the 2050s.

241. THE REG’L GREENHOUSE GAS INITIATIVE, <https://www.rggi.org/> (last visited Mar. 6, 2018).

would allow trading with RGGI states.²⁴² The RGGI program has put a descending cap on GHG emissions from the power sector, provides for trading of allowances, and distributes the bulk of allowances through an auction with a reserve price.²⁴³ The California-Quebec-Ontario program creates an economy-wide cap-and-trade program that covers all major GHG emission sources and further requires that distributors of fossil fuels and electricity importers surrender allowances equal to the emissions created by combustion of the fuels or generation of the imported electricity.²⁴⁴ That program also distributes many allowances by auction with a reserve price.²⁴⁵ If a rulemaking petition that would facilitate trading in these programs were presented to the EQB, the EQB would have a judicially enforceable constitutional duty to adopt that regulation. As discussed above, such a petition would rely on existing Pennsylvania authority and would describe a reasonably specific rule, thus overcoming the obstacles to mandamus that existed in *Funk*.

A. An Effective Regulatory Program Will Require Economy-Wide Coverage Under a Cap-and-Trade Program with Additional Measures to Prevent Leakage

Many legal models would achieve GHG emissions reduction using existing Pennsylvania law. These include a cap-and-trade program with a variety of mechanisms to distribute allowances, an emissions tax, and traditional regulatory techniques (such as technology-based emissions standards and permits that establish limits based on technology or other criteria). Not all of these mechanisms are authorized by current law. Although a mix of other authorized mechanisms can and should be employed as part of an effective program, as discussed below, none can achieve what will be required to meet the constitutional objectives without an economy-wide cap-and-trade program with an auction and reserve price.

An economy-wide GHG emissions tax set at the social cost of carbon and coupled with the leakage prevention measures discussed below could equally satisfy the constitutional prerequisites. However, a tax requires additional legislative action. By contrast, as also discussed below, a cap-and-trade program with an auction

242. 9 VA. ADMIN. CODE § 5-140. Regulation for Emissions Trading Programs (adding 9VAC5-140-6010 through 9VAC5-140-6430), 34 Va. Reg. Regs. 924-59 (Jan. 8, 2018); see also Darrell Proctor, *Virginia Moves to Join RGGI Carbon-trading Market*, POWER (Nov. 15, 2017), <http://www.powermag.com/virginia-moves-to-join-rggi-carbon-trading-market/>.

243. See *Elements of RGGI*, REGIONAL GREENHOUSE GAS INITIATIVE, <https://www.rggi.org/program-overview-and-design/elements> (last visited Mar. 6, 2018).

244. See CAL. AIR RES. BD., CALIFORNIA CAP-AND-TRADE PROGRAM: FACTS ABOUT THE LINKED CAP-AND-TRADE PROGRAMS 1 (2017), https://www.arb.ca.gov/cc/capandtrade/linkage/linkage_fact_sheet.pdf; CAL. AIR RES. BD., CAP-AND-TRADE REGULATION INSTRUCTION GUIDANCE 20-22 (2012), <https://www.arb.ca.gov/cc/capandtrade/guidance/chapter2.pdf>.

245. See *Reserve Sale Information*, CAL. AIR RESOURCES BOARD (Mar. 16, 2017), <https://www.arb.ca.gov/cc/capandtrade/reservesale/reservesale.htm>.

and a reserve price can be established by regulation under the existing authority of the APCA and Article I, § 27 without the need for further legislation. Moreover, a carbon tax will not guarantee achieving carbon neutrality by mid-century. A cap-and-trade program with an auction and reserve price and a descending cap reaching carbon neutrality by mid-century would also be at least as effective in reducing GHG emissions as a tax, would better ensure that the mid-century goal would be achieved, and would also recover income for the beneficiaries of the constitutional trust.²⁴⁶

Emissions reductions can also be achieved using traditional regulatory approaches. Typically, these approaches rely upon emissions limitations based on reductions that are deemed achievable using a certain technology. This was the technique used to derive the emissions reduction goals for the Clean Power Plan.²⁴⁷

Although elements of a command-and-control program (such as permits and emissions monitoring) will be required for any effective program, sole reliance on this typical regulatory approach will not achieve the constitutional objectives for a number of reasons.²⁴⁸ First, emissions limits based on what a given technology can achieve rather than the emissions reduction goal — *i.e.* the pathway necessary to achieve carbon neutrality by mid-century — are unrelated to the ultimate goal and will often fail to achieve it.²⁴⁹ By contrast, setting a declining cap based on the trajectory deemed appropriate to achieve the emissions reduction will result in certain reductions. Second, the determination of a technology-based limit is based on an *ex ante* estimate of emissions reduction costs and available technologies and usually results in a lower degree of emissions reduction than can actually be achieved at a

246. A cap-and-trade program with an auction differs from a tax in one key respect. With a tax, the market determines the extent of emissions reductions, and with the cap-and-trade program, the market determines the amount of money that is recovered. The cap-and-trade program with an auction with a reserve price combines the two approaches and best assures emissions reductions. This is because a cap is often initially set too leniently and neither recovers sufficient income nor assures reductions that can be achieved cost-effectively. Thus, when a cap is set too leniently, the reserve price in the auction results in excess allowances not being sold, acting as a tax and achieving additional cost-effective reductions. The California Court of Appeals held that California's GHG allowance auction (which utilizes a reserve price) is not a tax. *Cal. Chamber of Commerce v. State Air Res. Bd.*, 216 Cal. Rptr. 3d 694, 700 (Cal. Ct. App. 2017) ("These twin aspects of the auction system, voluntary participation and purchase of a specific thing of value, preclude a finding that the auction system has the hallmarks of a tax.").

247. See 40 C.F.R. pt. 60 (2017); see also Repeal of Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 82 Fed. Reg. 48,035, 48,037 (proposed Oct. 16, 2017) (to be codified at 40 C.F.R. pt. 60) (proposing a repeal of the Clean Power Plan in part because the "rule established performance standards for coal-fired plants assuming a uniform emissions rate well below that which could be met by existing units through any retrofit technology of reasonable cost available at the time").

248. See McKinstry, Peterson & Chester, *supra* note 192, at 10139-41 (discussing why a technology-based approach such as that applied in the Clean Power Plan is unlikely to result in the reductions necessary to achieve the objectives of the Paris Agreement).

249. *Id.* at 10140.

given cost.²⁵⁰ Third, as discussed below, it would be more difficult and perhaps impossible to prevent leakage²⁵¹ using a technology-based regulatory approach. Fourth, the process of reviewing technologies and developing standards is time and energy intensive, and the standards are unlikely to be put in place within a time frame necessary to achieve the necessary reductions.²⁵² Fifth, although technology-based standards are intended to be technology forcing, hard caps coupled with an increasing reserve price would better inform the market in advance and would be more likely to drive the necessary capital investment. Sixth, a traditional regulatory approach would not generate income for the beneficiaries of the constitutional trust.

Still, regulatory approaches could be helpful to address situations where the market does not function efficiently.²⁵³ California employs a number of supplemental measures to address these situations.²⁵⁴ For example, as a part of its cap-

250. In virtually all cases, emissions reductions have been achieved at a significantly lower cost than originally estimated. This means that a cap-and-trade program with a reserve price set at the social cost of carbon will likely result in more emissions reductions than might be achieved by attempting to determine what technologies could be employed at the social cost of carbon and establishing emissions limits based on those technologies. For example, in the Clean Power Plan, EPA based its determination of the required emissions reductions on an *ex ante* determination of what could be achieved by a suite of technologies. Analyses of the CPP concluded that allowance prices would initially be zero, meaning that the required “reductions” would be no greater than business as usual. McKinstry, Peterson & Chester, *supra* note 192, at 10139, n. 35; *see also id.* at 10140; David M. Driesen, *Is Emissions Trading an Economic Incentive Program?: Replacing the Command and Control/Economic Incentive Dichotomy*, 55 WASH. & LEE L.R. 289, 318-19 (1998).

251. The concept of leakage is discussed in the following section.

252. For example, 40 C.F.R. § 60, which establishes standards of performance for new stationary sources of air pollutants for various industrial categories, now contains subparts A through UUUU, with each subpart generally addressing a different industrial category. 40 C.F.R. § 60 (2016). In the decade following *Massachusetts v. EPA*, EPA has established technology-based standards for just one category, new and existing power plants, 40 C.F.R. § 60, subparts TTT & UUUU, and those standards have been stayed and are under reconsideration. Moreover, as discussed above, the standards were outdated even before implementation, such that the new source standards were weaker than the emissions being achieved by existing combined cycle natural gas-fired plants, and the standard for existing power plants was no better than business as usual. McKinstry, Peterson & Chester, *supra* note 192, at 10139-40.

253. *See* Daniel Shawhan, *Reductions and “Leakage” from US State Cap-and-Trade Programs* (Sept. 19, 2013), <http://www.rff.org/files/sharepoint/Documents/Events/Workshops%20and%20Conferences/Shawhan-presentation.pdf>; MEREDITH L. FOWLIE, MAR REGUANT, & STEPHEN P. RYAN, *MEASURING LEAKAGE RISK* 13 (2016), <https://www.arb.ca.gov/cc/capandtrade/meetings/20160518/ucb-intl-leakage.pdf>.

254. *E.g.*, CAL. AIR RES. BD., *CALIFORNIA’S 2017 CLIMATE CHANGE SCOPING PLAN, THE STRATEGY FOR ACHIEVING CALIFORNIA’S 2030 GREENHOUSE GAS TARGET* (2017), https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf. The additional measures include California’s renewable portfolio standard (RPS); a low carbon fuel standard; a multi-faceted mobile source strategy (including vehicle fleet standards, measures for encouraging the electrification of the vehicle fleet, and transportation and land use planning to reduce vehicle miles traveled); standards to reduce emissions of methane and carbon black as well as use of HFC’s; and measures to improve freight efficiency. *Id.* at 25, Table 1.

and-trade program, the state imposes a price on fuel based on the GHG emissions from its combustion by requiring fuel suppliers to acquire and surrender allowances. However, this approach will not readily produce emissions reductions if manufacturers do not make lower emissions vehicles available, or if suppliers do not make low carbon fuels available, or if homebuyers do not consider utility costs in deciding whether to purchase energy efficiency measures rather than granite countertops in their new homes.²⁵⁵ Therefore, measures like fleet emissions limits, fuel content requirements, and building codes requiring energy efficiency all reduce the cost of emissions reductions and can achieve greater emissions reductions when coupled with a cap-and-trade program. California includes measures such as these to support its cap-and-trade program.²⁵⁶ However, without the uniform ceiling created by the cap, and without the uniform price floor created by the reserve price, those measures alone will not achieve the emissions reductions within the time necessary to conserve and maintain a stable climate.

B. *The Significance of Leakage*

Both constitutional and practical policy considerations call for the implementation of a policy program that prevents or at least minimizes the phenomenon of “leakage.” Leakage refers to increases in emissions in unregulated sectors or unregulated jurisdictions that are caused by the relocation of emissions-generating activity away from the regulated sector or jurisdiction.²⁵⁷ Leakage can occur because a business shifts some or all of its production to other states or nations. Leakage may also occur between sectors. If the result of regulation is an increase of emissions in other sectors, in other states, or in other nations, at least some of the damage to the natural resources will occur in any case.

1. Types of Leakage

Interstate leakage occurs in the electricity sector, where electrons flow readily across state boundaries and where generation units are called upon to supply electricity to the grid in order of price.²⁵⁸ For example, if Pennsylvania puts a price on carbon but West Virginia does not, then generation units in West Virginia would not include an emissions price in their bids, and they would be able to submit lower bids. This would move the West Virginia units up in the order in which they are called. In some cases, this might result in a West Virginia coal-fired plant being

255. Although emissions reductions will ultimately occur even without the supplemental measures, a much higher price must be imposed without the supplemental measures.

256. *Supra* note 254, at ES16.

257. See Shawhan, *supra* note 253, at slide 5; FOWLIE ET AL., *supra* note 253, at 13.

258. Fed. Energy Regulatory Comm’n v. Elec. Power Supply Ass’n, 136 S. Ct. 760, 768-69 (2016) (describing the structure of competitive, interstate electricity markets).

called upon before a combined cycle natural gas plant in Pennsylvania, which has only about 40% of the emissions of the coal-fired plant.²⁵⁹ In that case, even though Pennsylvania coal-fired plants would operate less frequently, some of the emissions reductions would be offset by increased emissions from coal-fired plants in West Virginia operating more frequently. This type of leakage can also occur in regulatory regimes. If Pennsylvania requires the installation and operation of carbon capture and sequestration control equipment on its fossil-fired plants and West Virginia does not, the dispatch of electricity could also shift to West Virginia.

The EPA addressed interstate leakage of conventional air pollutants in its Cross-State Air Pollution Rule implementing the Clean Air Act's Good Neighbor provision.²⁶⁰ The EPA based its allowance caps and state budgets on models using a uniform allowance price.²⁶¹ In essence, this created a program imposing a uniform price across state boundaries to prevent leakage.²⁶² Similar mechanisms to put a uniform price on emissions will be required for programs requiring GHG emissions reductions in the electricity sector.

Leakage has been a significant problem for the RGGI cap-and-trade program, which is limited to the electricity sector. Although the RGGI program has achieved significant emissions reductions in RGGI states, a portion of those reductions has caused the shifting of dispatch to higher emitting fossil fuel-fired facilities in Pennsylvania and other states.²⁶³ This leakage not only limits the effectiveness of the RGGI program to reduce overall emissions, but also depresses RGGI

259. The national emissions data gathered by EPA and reported in the technical support documents for the Clean Power Plan indicated that in the Eastern Interconnection coal-fired plants emitted 1,356,066 thousand tons of carbon dioxide while producing 1,230,444 GWh of electricity for an emission rate of 1,102 tons/GWh, while combined cycle natural gas-fired plants emitted 328,220 thousand tons of carbon dioxide while producing 734,335 GWh, for an emission rate of 447 tons/GWh, or 40.6% of the average rate for the coal-fired fleet. ENVTL. PROT. AGENCY, OFFICE OF AIR & RADIATION, CO₂ EMISSION PERFORMANCE RATE AND GOAL COMPUTATION TECHNICAL SUPPORT DOCUMENT FOR CPP FINAL RULE 10, Table 3 (2015), <https://archive.epa.gov/epa/sites/production/files/2015-11/documents/tsd-cpp-emission-performance-rate-goal-computation.pdf>.

260. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,208 (August 8, 2011) (Cross-State Air Pollution Rule), *aff'd* Env'tl. Prot. Agency v. EME Homer City Generation, L.P., 572 U.S. 32 (2014); U.S. ENVTL. PROT. AGENCY, OFFICE OF AIR & RADIATION, CROSS-STATE AIR POLLUTION RULE, REDUCING AIR POLLUTION PROTECTING PUBLIC HEALTH (2011).

261. See 76 Fed. Reg. 48,248-53.

262. In the Cross-State Air Pollution Rule, EPA created state budgets based on air quality needs and the cost of "highly cost effective reductions," and it imposed uniform costs to prevent leakage. The U.S. Supreme Court recognized the problem of leakage and approved this approach to dealing with it in *Env'tl. Prot. Agency v. EME Homer City Generation, L.P.*, 572 U.S. ___, at 4 (2014).

263. SUE WING & MAREK KOLODZIEJ, THE REGIONAL GREENHOUSE GAS INITIATIVE: EMISSION LEAKAGE AND THE EFFECTIVENESS OF INTERSTATE BORDER ADJUSTMENTS 4 (2008), https://sites.hks.harvard.edu/m-rcbg/rpp/Working%20papers/RPP_2008_03_SueWing.pdf.

allowance prices.²⁶⁴ Allowance prices are so depressed by this leakage that New York needed to adopt a mechanism requiring electricity distribution companies to buy zero emission credits (ZECs) based on the social cost of carbon in order to prevent the premature closure of non-emitting nuclear units.²⁶⁵

Interstate and international leakage may occur in other industries, although not as readily as in the electricity industry. In the case of electricity generation, shifting dispatch of electricity units from one state to another based on price occurs immediately. However, products in other industries are not as readily fungible, and leakage may lead to the closing of a plant or moving production.²⁶⁶ The differ-

264. In the RGGI program, the California cap-and-trade program and other similar programs, an allowance represents the right to emit one metric ton of carbon dioxide or its equivalent. *See* RGGI 2017 MODEL RULE, at 4; CAL. CODE REGS., tit. 17, § 95802(8) (2018); These programs auction or otherwise distribute a number of allowances equal to the cap. *See Elements of RGGI, supra* note 244. Each regulated party must surrender a number of allowances equal to its emissions (or the emissions produced by the regulated products in the case of the California program) at the end of the applicable compliance period.

265. *Coal. for Competitive Elec. v. Zibelman*, 272 F. Supp. 3d 554, 561-63 (S.D.N.Y. 2017), *appeal filed* (2d Cir. Aug. 25, 2017) (quoting CES Order, app. E, at 1).

266. If a price is put on emissions from industries such as steel and fertilizer production in one state, production costs will increase in that state and a company might switch production to another plant in a state or nation that does not put a price on emissions. In that case, emissions will still occur, but in a different location. The disparity in production costs may cause a plant to close, shifting production elsewhere.

It is important to note that the electricity industry is fundamentally different from industries such as steel and fertilizer production. Electricity production must occur within a relatively limited geographic area that is tied to the consumer by the grid and is sufficiently proximate to prevent excessive transmission losses. For the most part, electricity cannot be stored and, although storage technologies are improving, they are still very limited; storage can occur for only a short period of time. Electricity therefore relies upon markets in which generation sources that can be turned on or off are called upon in the order of bids, and all electricity generators receive a price based upon the highest bid that is called upon. The bids are based on marginal operating costs and not on fixed or capital costs. Non-emitting sources, such as nuclear or most renewable generation sources, do not have significant marginal operating costs and cannot readily be turned on or off. These non-emitting sources, therefore, submit zero or negative bids and rely upon the bids of fossil generators to set the price of electricity that the non-emitting sources receive. If electricity prices are not sufficiently high, companies will not invest capital necessary to expand the capacity of non-emitting generation or to keep that generation operating. The fossil sources set their bids above their net marginal operating costs, which are based on the cost of fuel, pollution control and other marginal costs. If a fossil generator receives an allowance based on its production, that allowance will produce operating revenue offsetting the operating costs, allowing all fossil generators to submit lower bids. Lower electricity prices will reduce the amount of non-emitting generation by reducing the return on capital. In some cases, it may also move higher emitting facilities, such as coal-fired plants, up in the order of dispatch, thereby increasing emissions. For a discussion of wholesale electricity markets, *see* Fed. Energy Regulatory Comm'n v. Elec. Power Supply Ass'n, 136 S. Ct. 760, 768-72 (2016).

By contrast, steel and fertilizers operate in international markets and can be stored for long period of time in warehouses, so that the actions of a single state or even a group of states such as RGGI will not affect the price of a ton of steel or of fertilizer. If these industries are awarded allowances based on production, it will not affect price but will still create a strong incentive to reduce emissions and thereby

ence in industry structure may necessitate different leakage control mechanisms, as discussed in the next subsection.

Finally, if emissions control requirements are imposed or an emission price is imposed on the electricity sector but not on other sectors, then the other sectors may switch from electricity use to the use of fossil fuels. For example, if a price is put on emissions from the electricity sector but not on the transportation sector, electric cars and plug-in hybrids will be more expensive compared to vehicles with internal combustion engines, deterring the emissions reductions that would occur as a result of electrification of the transportation sector. This can also occur in the area of building heating and cooling. If a price is put on emissions from the electricity industry but not on heating oil or natural gas, it will encourage direct use of fossil fuels for heat instead of non-emitting electric heating, even in buildings that use non-fuel mechanisms to increase heating efficiency, such as ground source geothermal.²⁶⁷ Leakage may also affect production technology choice. For example, steel can be manufactured using an electric arc furnace, which uses electricity, or an open-hearth furnace, which uses coal. Increasing the cost of electricity emissions and the cost of electricity without putting a price on emissions from the electric hearth unit may cause leakage by shifting some production to the open-hearth technology.

2. Mechanisms to Prevent Leakage

The regulatory mechanisms employed by California pursuant to the Global Warming Solutions Act reflect consideration of each of these forms of leakage. To prevent intersectoral leakage, California has created an economy-wide cap-and-trade program applicable to GHG emissions from the electricity sector; emissions from other major air pollution sources; the import of electricity; and the sale of natural gas, heating oil, and gasoline.²⁶⁸ Interstate leakage in the electricity sector is controlled by requiring that importers of electricity surrender allowances equal to the GHG emissions resulting from the electricity generation.²⁶⁹ Interstate and international leakage from sectors vulnerable to international and interstate compe-

reduce costs. This will reduce and possibly eliminate the incentive to shift production to another state or country or to abandon capital by shutting a plant down.

267. Heat pumps are more efficient than other forms of electric heating, and ground source geothermal increases the efficiency of heat pumps significantly by allowing them to discharge heat into the subsurface while cooling and to pull heat from the subsurface while heating. Because the subsurface maintains a constant temperature over the seasons, the heat pump is able to operate at maximum efficiency, reducing the amount of electricity used and emissions that may be associated with that electricity.

268. CAL. CODE REGS. tit. 17, § 95101 (2018) (covered entities); *see generally* California Global Warming Solutions Act, CAL. HEALTH & SAFETY CODE §§ 38500-38599 (West 2018); CAL. CODE REGS., tit. 17, §§ 95801-96022 (2018).

269. CAL. CODE REGS. tit. 17, §§ 95101(b), 95852(b)(3) (2018).

tion is prevented by awarding allowances to those industries rather than requiring the allowances to be purchased at auction.²⁷⁰

The RGGI states attempt to eliminate leakage among the participating states through the creation of a uniform trading program, so that generators in the nine states will face similar costs and cannot benefit by switching dispatch or investment to other RGGI states.²⁷¹ Nevertheless, leakage has occurred as dispatch is switched to other nearby states that do not regulate GHG emissions or put a price on those emissions. For RGGI, as in Pennsylvania, it is impractical to require the surrender of allowances for imported electricity, as would happen in California.

PJM Interconnection, LLC (PJM), the regional transmission organization that oversees the dispatch and transmission of electricity in Pennsylvania and several RGGI states,²⁷² as well as New York Independent System Operator (NYISO) and Independent System Operator New England (ISO New England), are currently exploring mechanisms to prevent leakage and the market distortions caused by some states' failure to put an adequate price on GHG emissions. The mechanisms include border adjustments made by way of "carbon adders" that are placed on bids from fossil fuel-fired units in states without regulation or other border charges. NYISO commissioned a study "to explore whether and how New York State environmental policies limiting carbon may be pursued within the existing wholesale market structure."²⁷³ The NYISO study explained how, for the purpose of deciding the order in which generation units would be "dispatched" or called upon, border adjustments could assign a price or "carbon adder" that would be added to imports based on the generator's emissions and the price within New York.²⁷⁴ Exporters from New York would receive a credit based on the emissions charges.²⁷⁵ PJM, which involves multiple states, has gone further and described a mechanism that

270. *Id.* § 95891.

271. *See generally* RGGI 2017 MODEL RULE.

272. The interconnection itself is known as the Pennsylvania-New Jersey-Maryland Interconnection. PJM includes Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia.

In regions where electric utilities were restructured such that generation was deregulated (*i.e.* became competitive), regional transmission organizations (RTOs) and independent service operators (ISOs) manage wholesale electricity transmission, deciding which generation units should be dispatched. In other regions, the electricity transmission and generation are handled by traditional vertically integrated utilities. *See* CONG. RESEARCH SERV., REPORT R44783, FEDERAL POWER ACT (FPA) AND ELECTRICITY MARKETS (2017).

273. SAMUEL A. NEWELL ET AL., N.Y. DEP'T. OF PUB. SERV., N.Y. INDEP. SYS. OPERATOR, PRICING CARBON INTO NYISO'S WHOLESALE ENERGY MARKET TO SUPPORT NEW YORK'S DECARBONIZATION GOALS iv (2017), https://www.energymarketers.com/Documents/Brattle_study_carbon_pricing.pdf.

274. *Id.* at 23-26.

275. *Id.* at 24.

would create subregions to prevent leakage across regulated and unregulated regions by way of a two-stage process.²⁷⁶

Notably, the various mechanisms for limiting interstate and intersectoral leakage cannot operate effectively without a cap-and-trade program that imposes a uniform price on emissions.²⁷⁷ Therefore, at a minimum, an effective program will require such a cap-and-trade program with the opportunity to trade with other similar programs.²⁷⁸

C. Authority to Regulate Greenhouse Gas Emissions Under the Pennsylvania Air Pollution Control Act

The Commonwealth Court reasoned in the *Funk* decision that existing legislative authority to limit GHG emissions is a necessary basis for obtaining judicial relief requiring regulatory action to limit those emissions.²⁷⁹ The court's decision was based on well-founded separation of powers concerns.²⁸⁰ As also noted in *Funk*, and explained in greater detail below, regulation of GHG emissions is authorized under the APCA.²⁸¹ This statute governs the air pollution control program in Pennsylvania and authorizes the type of cap-and-trade program described above. The APCA authorizes the EQB to adopt air pollution regulations,²⁸² and the EQB has rules governing the submission of petitions for rulemaking under the

276. PJM, ADVANCING ZERO EMISSIONS OBJECTIVES THROUGH PJM'S ENERGY MARKETS: A REVIEW OF CARBON-PRICING FRAMEWORKS (2017), <http://pjm.com/~media/library/reports-notice/special-reports/20170502-advancing-zero-emission-objectives-through-pjms-energy-markets.ashx>. These leakage prevention mechanisms require approval by the Federal Energy Regulatory Commission.

277. The leakage control mechanisms rely upon a fungible price to eliminate interstate disparities caused by the state's putting a price on GHG emissions. If a state relied on a more traditional regulatory approach, such as establishing emissions limits, it would lack jurisdiction to impose those limits on other states or nations. A regulatory approach is insufficiently fungible to allow a state to impose a charge that equalizes the effect, particularly in light of the dormant commerce clause. U.S. CONST., art. I, § 8, cl. 3.

278. Clean Air Rule, WASH. ADMIN. CODE § 173-442-100 (2016). The State of Washington Department of Ecology has adopted a Clean Air Rule, which creates a different type of program that requires annual percentage GHG emissions reductions and allows the use of tradeable emissions allowances from other states to satisfy the emissions reduction obligation. See generally WASH. ADMIN. CODE § 173-442. This regulation has been suspended because of a decision partially invalidating it. Regardless, this approach would not be applicable to Pennsylvania because it would not generate income for beneficiaries of the trust. Although it assures emissions reductions, the ability to trade under the program ultimately depends upon other jurisdictions creating tradable allowances with a transparent price.

279. *Funk v. Wolf*, 144 A.3d 228, 235, 248-49 (Pa. Commw. Ct. 2016) *aff'd without opinion*, 158 A.3d 642 (Pa. 2017).

280. *Id.* at 235.

281. 35 PA. CONS. STAT. § 4001-4015 (2011).

282. *Id.* § 4005.

APCA.²⁸³ The APCA further authorizes DEP to administer air regulatory programs, including regulations adopted by the EQB.²⁸⁴

The APCA provides DEP with the authority to regulate air pollution in accordance with the federal Clean Air Act.²⁸⁵ The APCA states that DEP “shall have the power and its duty shall be to [i]mplement the provisions of the Clean Air Act in the Commonwealth.”²⁸⁶ The Act further provides that the EQB “[s]hall have the power and its duty shall be to [a]dopt rules and regulations to implement the provisions of the Clean Air Act,” which “shall be consistent with the requirements of the Clean Air Act and the regulations adopted thereunder.”²⁸⁷ These provisions suggest that the EQB has broad authority to promulgate regulations consistent with the requirements of the Clean Air Act and that DEP has authority to implement the provisions of the federal Clean Air Act.

The statute further provides that no operating permit may be issued by DEP unless it determines that the source will not discharge air contaminants “in violation of any performance or emission standard or other requirement” established by EPA or DEP.²⁸⁸ Further, DEP must revise any permit to incorporate applicable standards and regulations promulgated under the Clean Air Act after issuance of the permit in accordance with a timeframe set forth in the statute.²⁸⁹ Because GHGs are now clearly pollutants under the Clean Air Act,²⁹⁰ DEP must regulate those gases, at least to the extent set out in the federal Clean Air Act. This includes control of new or modified major stationary sources emitting 75,000 tons or more of greenhouse gases if that source also emits other pollutants regulated under the Clean Air Act.²⁹¹

283. 23 PA. CODE §§ 23.1-23.8 (2011).

284. 35 PA. CONS. STAT. § 4004.

285. 42 U.S.C. §§ 7401-7671q (1970).

286. 35 PA. CONS. STAT. § 4004(1) (2011).

287. *Id.* § 4005(a)(8).

288. *Id.* § 4006.1(b)(2).

289. *Id.* § 4006.1(k).

290. *Coal. for Responsible Regulation, Inc. v. U.S. Env'tl. Prot. Agency*, 684 F.3d 102 (D.C. Cir. 2012) *aff'd in part and rev'd in part on other grounds sub nom*; *Util. Air Regulatory Grp. v. Env'tl. Prot. Agency*, 134 S. Ct. 2427 (2014); *see also Funk v. Wolf*, 144 A.3d 228, 250, n.17 (Pa. Commw. Ct. 2016), *aff'd without opinion*, 158 A.3d 642 (Pa. 2017)

291. In *UARG*, the U.S. Supreme Court upheld EPA regulation requiring control of greenhouse gases emitted by sources otherwise subject to Prevention of Significant Deterioration (PSD) review in quantities of at least 75,000 tons per year of carbon dioxide equivalent. *Prevention of Significant Deterioration and Title V Permitting for Greenhouse Gases: Removal of Certain Vacated Elements*, 80 Fed. Reg. 50,199 (Aug. 19, 2015); *see also Funk*, 144 A.3d at 250 n.17.

The Clean Power Plan, which would limit GHG emissions from power plants, has been stayed until all legal challenges are resolved. *West Virginia v. Env'tl. Prot. Agency*, 136 S. Ct. 1000, 1000 (2016). Certain other rules limiting GHG emissions are under reconsideration by EPA. Still, these regulations remain on the books. There are many other laws and regulations limiting GHG emission under the Clean Air Act that remain in force and are not under reconsideration. More significantly, there are

The EQB's duty to adopt regulations limiting GHG emissions goes beyond the minimum that may be required under the Clean Air Act, even without considering the Commonwealth's duty as a trustee under the ERA. The APCA provides the EQB with the authority and the mandatory duty to:

Adopt rules and regulations, for the prevention, control, reduction and abatement of air pollution, applicable throughout the Commonwealth or to such parts or regions or subregions thereof specifically designated in such regulation which shall be applicable to all air contamination sources regardless of whether such source is required to be under permit by this act.²⁹²

Those rules and regulation may, among other things, "prohibit or regulate any process or source or class of processes or sources."²⁹³ Further, the APCA authorizes the Department to:

Prepare and develop a general comprehensive plan for the control and abatement of existing air pollution and air contamination and for the abatement, control and prevention of *any new* air pollution and air contamination . . . and to submit a comprehensive plan to the [EQB] for its consideration and approval.²⁹⁴

The APCA defines "air contaminant" to include a "gas," which would therefore include greenhouse gases.²⁹⁵ The statute defines "air contamination" as the "presence in the outdoor atmosphere of an air contaminant which contributes to any condition of air pollution."²⁹⁶ It further defines "air pollution" as:

The presence in the outdoor atmosphere of any form of contaminant, including, but not limited to, the discharging from stacks, chimneys, openings, buildings, structures, open fires, vehicles, processes or any other source of any . . . gases, vapors, . . . or any other matter in such place, manner or concentration inimical or which may be inimical to the public health, safety or welfare or which is or may be injurious to human, plant or animal life or to property or which unreasonably interferes with the comfortable enjoyment of life or property.²⁹⁷

substantial arguments that GHG emissions from power plants and other stationary sources must be regulated under section 111 of the Clean Air Act. *See American Elec. Power Co. v. Connecticut*, 564 U.S. 410 (2011).

292. 35 PA. CONS. STAT. § 4005(a)(1) (2011).

293. *Id.*

294. *Id.* at § 4004(18) (emphasis added).

295. *See id.* § 4003 (definition of "air contaminant").

296. *Id.* § 4003 (definition of "air contamination").

297. *Id.* § 4003 (definition of "air pollution").

The EPA endangerment finding under the Clean Air Act, the 2015 DEP report under the Climate Change Act, and a wide variety of other scientific studies support the conclusion that GHGs constitute air pollution.²⁹⁸

Moreover, the Climate Change Act requires not only a report on greenhouse gas impacts every three years but also requires DEP to develop a climate change action plan for submission to the Governor identifying “cost-effective strategies for reducing and offsetting GHG emissions.”²⁹⁹ This provision would not make sense unless the APCA allowed regulation of GHGs. The fact that the plan is submitted to the administrative branch rather than the legislative branch suggests that the General Assembly contemplated that the administrative branch could implement those strategies through rulemaking and other actions already authorized by the General Assembly. Thus, DEP has authority under existing law to regulate GHGs through adoption of regulations by EQB, even in the absence of regulations under the federal Clean Air Act.³⁰⁰

Case law also supports this position. In *Commonwealth, Department of Environmental Resources v. Pennsylvania Power Co.*,³⁰¹ the Commonwealth Court held

298. See *Massachusetts v. Env'tl. Prot. Agency*, 549 U.S. 497, 528-530 (2007) (analysis of why greenhouse gases are air pollutants under the Clean Air Act).

299. See 71 PA. CONS. STAT. §§ 1361.3, 1361.7 (2018). Although the Act also requires the Plan to recommend legislative changes, this should not be read to suggest that existing law does not authorize comprehensive regulation.

300. The APCA limits the stringency of some regulations that the EQB may adopt. These limitations are unlikely to apply to regulations limiting GHG emissions even assuming that they are constitutional under the Court's decisions in *Robinson Twp.* and *PEDF*. Section 4004.2 of the APCA prohibits regulation beyond that necessary to meet the minimum requirements of the federal Clean Air Act for purposes of implementing section 109 of the Clean Air Act, which relates to “criteria pollutants” governed by National Ambient Air Quality Standards (NAAQS) established for GHGs. See 35 PA. CONS. STAT. § 4004.2 (2018). That section does not apply because EPA has not established a NAAQS for GHGs. Even if EPA establishes a NAAQS for GHGs in the future, it must be set at a level sufficient to protect public health and welfare. See 42 U.S.C. § 7409 (2012). Achieving and maintaining that NAAQS will require emissions reductions commensurate with the social cost of carbon so that the regulation described here would be consistent with that section. Further, the EQB may not establish “a more stringent performance or emission standard for hazardous air pollutant emissions from existing sources” than federal section 112 standards. 35 PA. CONS. STAT. § 4006.6(a) (2018); see *PPL Generation, LLC v. Commonwealth, Dep't of Env'tl. Prot.*, 986 A.2d 48, 50-51 (Pa. 2009). That section does not apply because greenhouse gases are not considered “hazardous air pollutants,” which is a narrow term referring to air pollutants that present “a threat of adverse human health effects.” See 42 U.S.C. § 7412(b)(1) (list of hazardous air pollutants that does not include greenhouse gases); *Id.* § 7412(b)(2) (criteria for revising the list, which emphasize that only pollutants which present a threat of adverse human health effects may be added and explicitly excludes substances added solely “due to [their] adverse effects on the environment.”).

301. *Commonwealth, Dep't of Env'tl. Res. v. Pa. Power Co.*, 384 A.2d 273, 284-85 (Pa. Commw. Ct. 1978)

After careful consideration of the CAA, the APCA and the pertinent legislative histories thereto, we must agree with DER and conclude that the purpose behind the APCA and the provisions contained therein is to provide the people of this Commonwealth with air which is of a higher quality than that required by federal law.

that the APCA authorized regulations more stringent than federal regulations.³⁰² In addition, the Pennsylvania Supreme Court recognized that Article I, § 27 authorizes DEP to adopt regulations going beyond the statutory minimum in order to implement a statute's legislative purposes.³⁰³ In *Funk*, as previously noted, the Commonwealth Court noted that DEP and other state respondents "acknowledge that the General Assembly, through the APCA, bestowed upon them a duty to promulgate and implement rules and regulations to reduce CO₂ and GHG emissions."³⁰⁴

The APCA also contains sufficient authority to extend regulations throughout the economy, by going "upstream" and regulating fossil fuels where it is impractical to regulate the emissions source. It is impractical to require that vehicles and individual homes and buildings measure emissions and surrender allowances.³⁰⁵ The RGGI program and the proposed Virginia emissions trading program cover only certain larger electricity-generating facilities,³⁰⁶ whose GHG emissions are measured and reported under federal law³⁰⁷ and can therefore be readily regulated. These programs nonetheless fail to capture the majority of GHG emissions³⁰⁸ and therefore allow intersectoral leakage. By contrast, the California-Quebec-Ontario cap-and-trade-program extends to all major air pollution emissions sources where emissions can be measured, and also extends to sectors where it

rev'd in part on other grounds, 426 A.2d 995 (1980).

302. *Commonwealth, Dep't of Env'tl. Res.*, 384 A.2d at 284.

303. *Eagle Env'tl. II, L.P. v. Commonwealth, Dep't of Env'tl. Prot.*, 144 A.3d 228 (2005).

304. *Id.* at 250.

305. These small sources are not individually regulated under federal or state law and are not required individually to obtain a permit or to measure or report emissions. Regulating the millions of sources individually would create an undue administrative burden for both the regulators and the regulated community. Indeed, EPA deemed it impractical to regulate even larger sources of GHG emissions that would exceed a 250 ton per year threshold and, for that reason the Supreme Court in *UARG* defined the use of the term "pollutant" in the new source review provisions of the Clean Air Act to exclude carbon dioxide. Individual homes and vehicles generally emit GHGs at lower levels and their individual regulation would be even less feasible.

306. CO₂ BUDGET TRADING PROGRAM GENERAL PROVISIONS, MODEL RULE, § XX-1.4(a), (REG'L GREENHOUSE GAS INITIATIVE) 2017, https://www.rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf; 9 VA. ADMIN. CODE §§ 5-140-10 to 5-140-260, Regulation for Emissions Trading Programs, 9VAC5-140 (Jan. 8, 2018).

307. Mandatory Reporting of Greenhouse Gas Emissions, 40 C.F.R. § 90 (2012).

308. U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2016 ES-6 to ES-7 (2018), https://www.epa.gov/sites/production/files/2018-01/documents/2018_complete_report.pdf (In 2016, the entire electric power sector in the United States emitted 1,809.3 million metric tons of carbon dioxide, or 34.1 percent of the total 5,310.9 million metric tons of carbon dioxide emitted by all sectors (transportation, industrial, residential, commercial and U.S. territories in addition to the electric power sector) and 27.8 percent of the total 6,511.3 million metric tons of emissions when all categories of GHGs (methane, nitrous oxide, HFCs, PFCs, SF₆ and NF₃ in addition to carbon dioxide) are included).

is infeasible to regulate the emissions source.³⁰⁹ That program also requires that those distributing fossil fuels within the state or importing electricity or fuels acquire allowances, and therefore captures the majority of GHG emissions and more effectively prevents leakage.³¹⁰ This vastly more effective program is authorized by existing law in Pennsylvania.

The APCA authorizes and gives the EQB the power and the duty to adopt regulations applicable to “all air contamination sources regardless of whether such source is required to be under permit by this act” and states that these regulations may “prohibit or regulate the combustion of certain fuels.”³¹¹ This authorization appears to encompass the broader and more effective California-Quebec-Ontario approach, particularly when read in light of the Commonwealth’s duty as a trustee under the ERA.

There are cogent reasons for adopting the broader California-Quebec-Ontario approach and interpreting the APCA to support that approach. Most notably, it prevents leakage between sectors subject to a carbon price and those not subject to a price. For example, if electricity prices rise as a result of putting a price on carbon emissions, and if the price of GHG emissions is not reflected in the price of motor vehicle fuels, this may discourage the purchase and use of electric vehicles, resulting in increased emissions of both GHGs and conventional pollutants. If electricity prices increase as a result of regulations and an equivalent price is not reflected in the price of natural gas and home heating oil, the price disparity may discourage electrification of the building sector and many industries. Electrification of these sectors will be required to achieve carbon neutrality by mid-century, as required to conserve and maintain a stable climate.

As noted above, interstate emissions trading with uniform pricing is one of the mechanisms necessary to prevent leakage. The Pennsylvania Uniform Interstate Air Pollution Agreements Act authorizes participation in interstate trading programs.³¹² That Act encourages DEP to coordinate and cooperate with “State and local authorities of other states affected by air sheds or regional air masses lying partly within another state or states, or moving between or among this State and another state or states.”³¹³ This statute, along with the broad authorizations in the APCA to address air pollution and to implement the Clean Air Act as interpreted by Pennsylvania courts, appears to authorize Pennsylvania to develop and participate in interstate trading arrangements that would put a price on carbon. These

309. CAL. CODE REGS. tit. 17, § 95811(a)-(h) (2012); *see also* CAL. LEGISLATIVE ANALYST’S OFFICE, THE 2017-18 BUDGET: CAP-AND-TRADE 5 (2017), <http://www.lao.ca.gov/reports/2017/3553/cap-and-trade-021317.pdf>.

310. CAL. LEGISLATIVE ANALYST’S OFFICE, *supra* note 309

311. 35 PA. CONS. STAT. § 4005(a)(1) (1992).

312. 35 PA. CONS. STAT. §§ 4101-4106 (1972).

313. *Id.* § 4103(a); *see also id.* § 4101 (making it the policy of Pennsylvania to encourage interstate cooperation and agreements).

include RGGI; the broader programs being implemented by California, Quebec, and Ontario; the trading-ready program being developed by Virginia,³¹⁴ or a similar interstate or regional arrangement involving emissions trading or other mechanisms to put a price on GHG emissions or otherwise limit those emissions.³¹⁵

Under RGGI, allowances are auctioned by each state and a portion of the auction revenue (or a portion of the allowances themselves) must be devoted to strategic energy purposes.³¹⁶ Although the APCA lacks specific authorization for auc-

314. Joining or leaving RGGI is arguably an action within the purview of the governor's executive power, even without other authority. Both the Governor of New York, in joining RGGI, and the Governor of New Jersey, in leaving RGGI, relied on their executive power. *See, e.g.*, *Thrun v. Cuomo*, 976 N.Y.S.2d 320, 323 (N.Y. App. Div. 2013); *In re Reg. Greenhouse Gas Initiative*, No. A-4878-11T4 (N.J. Super. Ct., App. Div. Mar. 25, 2014) (holding that notice and comment rulemaking is required before withdrawing rules implementing RGGI in response to Governor Christie's withdrawal from RGGI). The Governor of Virginia has issued an Executive Order directing the creation of a cap-and-trade program for the electricity sector. Executive Directive 11 (2017), <http://governor.virginia.gov/media/9155/ed-11-reducing-carbon-dioxide-emissions-from-electric-power-facilities-and-growing-virginias-clean-energy-economy.pdf>. Pursuant to that Order, the State has published a proposed regulation that mirrors the RGGI program and would allow trading even without Virginia joining RGGI. *See* 9 VA. ADMIN. CODE § 5-140. Regulation for Emissions Trading Programs (adding 9VAC5-140-6010 through 9VAC5-140-6430), 34 Va. Reg. 924 (Jan. 8, 2018).

315. *See* 35 PA. CONS. STAT. § 4103(b) (2011). The Act imposes limitations on such agreements, requiring that DEP not delegate its enforcement authority to other states or agencies and limiting appropriation authority and authority to pledge credit. 35 PA. CONS. STAT. § 4105 (2011). However, these limitations would not prevent participation in RGGI or similar interstate trading programs, since these programs are premised on voluntary coordination where each state relies upon its own statutes and regulations and each state enforces its own requirements.

The APCA also includes a provision authorizing the DEP to cooperate with other states and interstate agencies to control and prevent air pollution, and "where appropriate formulate interstate air pollution control compacts or agreements for the submission thereof to the General Assembly." 35 PA. CONS. STAT. § 4004(24) (2011). Although this provision might be read to suggest that legislative authority is necessary before Pennsylvania could join an interstate trading program and adopt any necessary regulations to implement the program, it seems directed to agreements that are binding on the state and therefore require Congressional consent under the compacts clause of the U.S. Constitution. U.S. CONST. art. I, § 10 cl. 3. The trading regimes being independently implemented by states are implemented through a non-binding memorandum of understanding under which each state enacts and enforces its own laws and regulations, and therefore likely would not require Congressional approval under the Compacts Clause or require legislative approval under the APCA. *See* *U.S. Steel Corp. v. Multistate Tax Comm'n*, 434 U.S. 452, 470 (1978) (holding that creation of an "active administrative body" without Congressional consent did not "enhance the political power of the member States in a way that encroaches upon the supremacy of the United States" and therefore did not violate the Compacts Clause. The Court based its decision upon the following factors: (1) there were no features that, on their face, infringed on the supremacy of the United States; (2) the Compact did not authorize any of the member states to "exercise any powers they could not exercise in its absence"; (3) there was no "delegation of sovereign power to the Commission" and the states retained "complete freedom to adopt or reject the rules and regulations of the Commission"; and (4) each state was "free to withdraw at any time"); *NE Bancorp v. Bd. of Governors of Fed. Reserve Sys.*, 472 U.S. 159 (1985).

316. *See* Reg'l Greenhouse Gas Initiative, *Memorandum of Understanding*, ¶ G(1) (2005) ("25% of the allowances will be allocated for a consumer benefit or strategic energy purposes" as further defined

tions of emissions rights, a partial allowance auction has been implemented in Pennsylvania in the past, since the Title IV program under the federal Clean Air Act allocates some allowances by auction.³¹⁷

More significantly, the *PEDF* decision suggests that an auction with a reserve price is constitutionally required to allow the beneficiaries of the trust to benefit from the program. As discussed below, allowances may be considered to represent ecosystem services in that they represent the limited remaining ability of the atmosphere to absorb additional GHG pollution without disruption. Because the revenues would derive from efforts to preserve the environmental trust, these revenues could be considered the result of the sale of renewable ecosystem services, similar to revenue from timber sales on state forest land. *PEDF* applied the law of trusts to invalidate a distribution of trust principal but recognized that trust income from renewable services that did not deplete the trust corpus could be moved to the General Fund.³¹⁸ The rule of prudence requires that a trustee manage a trust with the prudence that a reasonable person would manage his or her own affairs, considering the needs of beneficiaries, the need to preserve the corpus of the trust, and the amount and regularity of income.³¹⁹ Although this rule of prudence allows considerable discretion in managing a trust, it does not allow the trustee to give away either the principal or the income with no benefit to the beneficiaries or to favor one beneficiary over the other. Thus, the state auctions timber, minerals and other renewable and non-renewable resources produced by state forests. For this reason, an auction of GHG emissions allowances is not only authorized but arguably required in the absence of another rationale, such as preventing leakage.

VI. ISSUES RELATING TO POSSIBLE LIMITATIONS ON AWARD OF ALLOWANCES AND USE OF REVENUES

PEDF restricted the General Assembly's ability to direct lease revenues to the unrestricted general fund based on the Court's conclusion that the Pennsylvania Constitution required the principal of the environmental trust created by the ERA to be retained for the purposes set forth in the Constitution.³²⁰ We have argued that *PEDF* restricts the Commonwealth's ability to award allowances without recovering income for the beneficiaries. We also have argued that the ERA both authorizes an auction with a reserve price based on the social cost of carbon and requires a mechanism that both limits GHG emissions to a level consistent with that

in the paragraph), https://www.rggi.org/sites/default/files/Uploads/Design-Archive/MOU/MOU_12_20_05.pdf.

317. 42 U.S.C. § 7651 (2012).

318. Pa. Envtl. Def. Found. v. Commonwealth, 161 A.3d 911, 935-36 (Pa. 2017).

319. RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); see also Harvard Coll. v. Amory, 26 Mass (9 Pick) 446 (1830).

320. See *PEDF*, 161 A.3d at 934.

required to prevent climate disruption and provides reasonable income to the beneficiaries of the ERA's trust. In this section, we address the limits of these requirements with respect to GHG emissions allowances and proceeds from the auction or sale of those allowances.

The law of trusts does not put handcuffs on a trustee. Rather, it imposes a rule of prudence, requiring that a trustee manage a trust with the prudence that a reasonable person would manage his or her own affairs, considering the needs of beneficiaries, the need to preserve the corpus, the trust, and the amount and regularity of income.³²¹ Instead of being considered the proceeds from the liquidation of the principal of the trust, auction revenues are more properly considered to constitute income from measures to manage the trust corpus, much like income from sustainable harvest of timber. Therefore, the proceeds from these revenues can be used for any purpose, provided the use accrues to the benefit of the trust's beneficiaries.³²² Likewise, the trustee need not receive income equal to the social cost of carbon in all instances regardless of the outcome, but may award allowances for a lesser cost or even no cost where the Commonwealth, as a prudent business person, could conclude this would serve the best interest of the beneficiaries. For example, awarding allowances at a lower cost or no cost would be prudent where necessary to prevent leakage that would drive business from the Commonwealth without achieving a necessary reduction in GHG emissions. However, these situations should be treated as exceptions to the general rule and should be applied only as prudence demands.

A. *PEDF's Implications with Respect to Use of Revenues from GHG Emissions Auction*

Questions have arisen as to whether *PEDF* has implications with respect to potential mechanisms to put a price on carbon. Without additional legislation, proceeds from an auction would be deposited in the General Fund.³²³ If *PEDF* restricts use of these revenues, the decision would remove a significant incentive for Pennsylvania to impose a price on carbon through an allowance auction. The proceeds of a carbon tax or auction could be used to promote a variety of important fiscal objectives.³²⁴ In addition, the current and the on-going budget crisis in Pennsylvania has created a very significant incentive for the General Assembly to adopt legislation establishing a GHG emission fee or auction and trade program or to

321. RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); see also *Harvard Coll.*, 26 Mass (9 Pick) 446.

322. See RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); see also *Harvard Coll.*, 26 Mass (9 Pick) 446.

323. 72 PA. CONS. STAT. § 8 (1991).

324. See McKinstry et al., *supra* note 185, at 218-21.

allow the EQB's adoption of regulations establishing an auction, so as to generate revenue to fill the gap in the General Fund.³²⁵

PEDF should not restrict the use of revenues from a GHG auction. The analysis of this issue differs according to how one views the auction. In this regard, there are two ways of looking at the auction of allowances. On one hand, one can view the auction of allowances as a regulatory mechanism to reduce GHG emissions. On the other hand, one can view the auction of allowances as a charge for the sale of a public natural resource, either: (1) the air, (2) the limited capacity of the atmosphere to absorb GHG emissions without disrupting the climate, or (3) the costs that will be imposed on future generations from carbon dioxide emissions (*i.e.* "ecosystem services" — one of the natural values of the environment).³²⁶ In both economic and legal theory, the auction has characteristics of both a regulatory mechanism and a charge. However, because differing legal and political considerations apply depending upon whether the fee/auction is characterized as a regulatory mechanism or as a fee for ecosystem services, we will address the considerations applicable to each rationale separately.

If the auction is examined through the regulatory lens, *PEDF* should have no impact on use of the revenues. An auction of allowances is simply one of several regulatory mechanisms to reduce emissions. In this way it is no different from a regulatory emission limit. Under this lens, the auction is a mechanism that acts to preserve the corpus of the trust created by the ERA. Its imposition is therefore consistent with the trustee's duty to preserve the corpus of the trust and there should be no restrictions on the use of revenues.

Characterizing the auction/fee as purely a regulatory measure, however, has both legal and political disadvantages. Treating the auction as purely a regulatory measure under the APCA might undermine the argument for an auction with a meaningful reserve price. The APCA lacks specific legislative authorization for an auction or a reserve price, so that regulations establishing an auction and a reserve price without further action by the General Assembly depend to some degree upon

325. Mary Soderberg & Josh Shapiro, *Pennsylvania In Peril: A Financial Crisis*, THE WOLF TRANSITION (Nov. 19, 2014), <http://www.wolftransitionpa.com/sections/blog/pennsylvania-fiscal-crisis>. Although this source was prepared immediately after Governor Wolf's election, the state of finances has not improved, and the budget continues to rely upon sales of assets and transfers that the Supreme Court in *PEDF* found illegal. See PA. OFFICE OF THE BUDGET, 2017-18 BUDGET IN BRIEF (2017), <http://www.budget.pa.gov/PublicationsAndReports/CommonwealthBudget/Documents/2017-18%20Proposed%20Budget/2017-18%20Budget%20In%20Brief%20-%20Web.pdf>.

326. Ecosystem services have been defined as "benefits people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as regulation of floods, drought, land degradation, and disease; supporting services such as soil formation and nutrient cycling; and cultural services such as recreational, spiritual, religious and other nonmaterial benefits," including a stable climate. UNEP SECRETARIAT OF THE CONVENTION ON BIOLOGICAL DIVERSITY, BEST POLICY GUIDANCE FOR THE INTEGRATION OF BIODIVERSITY AND ECOSYSTEM SERVICES IN STANDARDS, CBD Technical Series No. 73 (2012), at 14, <https://www.cbd.int/doc/publications/cbd-ts-73-en.pdf>.

authorization under the ERA. Treating the auction as purely a regulatory mechanism may also undermine the argument that the reserve price should be set equal to the social cost of carbon rather than the far lower reserve prices seen in the California and RGGI programs, which are lower than the marginal cost necessary to prevent further climate disruption. Perhaps more significantly, characterizing the auction as a regulatory mechanism rather than the purchase of ecosystem services could be less palatable to those conservatives who support climate action. The conservative case for a carbon fee is based on the principle that GHG emitters should be charged a fee for the cost of the risk of environmental or other damage that will arise from use of the environment/ecosystem services, rather than the notion that regulation should be expanded.³²⁷

On the other hand, if one looks at the revenues from the GHG fee/auction as payments for ecosystem services, there is a risk that arguments will be raised that these revenues cannot be devoted to the General Fund to help address Pennsylvania's budget crisis but must be retained as part of the corpus of the ERA trust. Although there is a risk that this argument may be raised, close examination of the *PEDF* decision, and the facts presented there, suggest that this argument should not prevail. Even if this argument prevails, it would not require retention of all revenues or even any revenues.

The legislation at issue in *PEDF* diverted revenues that had been devoted to the maintenance of the corpus of the trust away from that purpose and impaired DCNR's ability to maintain parks and forests, which also constitute the corpus of the trust.³²⁸ In contrast, the establishment of a GHG auction and generation of revenues would not divert any existing, similarly committed revenues away from the trust or impair the Commonwealth's ability to maintain and conserve public natural resources. It would instead create new revenues by a mechanism that would also maintain and conserve the corpus of the trust.

It should be noted that, even if the fee/auction is viewed as *both* a regulatory mechanism and the sale of a natural resource, the trustee should be entitled to distribute income to the beneficiaries as long as the revenue does not deplete or impair the trust corpus. In *PEDF*, the Commonwealth was selling non-renewable resources and depleting the corpus of the trust, which should not be depleted.³²⁹ A GHG auction preserves the capital and produces the equivalent of dividend income. Since the application of the income will benefit the beneficiaries, that in-

327. See, e.g., Marc Gunther, *Climate Converts: The Conservatives Who Are Switching Sides on Warming*, YALEENVIRONMENT360 (Mar. 30, 2017), <http://e360.yale.edu/features/climate-converts-the-conservatives-who-are-switching-sides-on-climate-change>; Jerry Taylor, *The Conservative Case for a Carbon Tax*, NISKANEN CTR. (Mar. 23, 2015), <https://niskanencenter.org/wp-content/uploads/2015/03/The-Conservative-Case-for-a-Carbon-Tax1.pdf>; Bob Litterman, *What is the Right Price for Carbon Emissions*, 36 REGULATION 38 (2013), <https://object.cato.org/sites/cato.org/files/serials/files/regulation/2013/6/regulation-v36n2-1-1.pdf>.

328. Pa. Env'tl. Def. Found. v. Commonwealth, 161 A.3d 911, 937-39 (Pa. 2017).

329. *Id.*

come could go to the General Fund. In fact, because the social cost of carbon is set at the marginal cost/value of avoided future damage to trust resources, all revenues equal to the social cost of carbon come from measures to preserve the trust principal and can be considered income. As long as the principal is maintained, and income is provided for the benefit of the beneficiaries, the rule of prudence should be satisfied.

B. PEDF's Implications with Respect to Award of Allowances

We argue that allowances, as attributes of the environmental trust, should generally be auctioned, just as other sustainable products of the environmental trust should be auctioned. We also argue that the auction should include a reserve price based on the social cost of carbon to assure that the measures undertaken in response to the cap-and-trade program will include the measures necessary to prevent human-caused climate disruption. This does not require an ironclad rule. Under the rule of prudence applicable to trustees, certain exceptions may be appropriate to prevent or moderate leakage, while still preserving the corpus of the trust and producing a stream of income to the trust's beneficiaries.³³⁰

First, under the rule of prudence, in order to prevent leakage, Pennsylvania could allow distribution of allowances free of charge or at a reduced rate to industries subject to international or interstate competition where necessary to preserve those industries' international markets. Because the allowances will have a value equal to or greater than the reserve price in the auction, these industries will still have strong incentive to reduce emissions and rely on electricity rather than fossil fuels. However, they will be able to price their products competitively and they will no longer have an incentive to move their operations to a state or nation without regulation where those operations would result in leakage. This approach will need to be employed cautiously, so as to avoid perverse results.³³¹

Second, it may be appropriate to provide for a lower reserve price initially if warranted to assure adequate long-term income. The RGGI and California-Quebec-Ontario programs all include significantly lower auction minimum reserve

330. See RESTATEMENT (THIRD) OF TRUSTS § 90 (2007); see also *Harvard Coll. v. Amory*, 26 Mass (9 Pick) 446 (1830).

331. For example, as discussed *supra* note 265, in industries outside the electricity sector with international markets (such as steel), it may be worthwhile to award free or reduced cost allowances based on the prior year's unit production, with the number of free allowances per unit of production decreasing over time. That approach would have perverse results, however, if it were applied to the electricity sector, since it would encourage production even where that production would increase overall emissions. In the electricity sector, an allowance would represent income and, if tied to production, would allow a lower bid, removing the incentive to switch dispatch away from units with higher emissions. Therefore, industry structure should be carefully assessed and exceptions to the general rule allowed only where strictly warranted.

prices,³³² as well as cost containment reserves that provide for the release of additional allowances if allowance prices exceed a value significantly lower than the social cost of carbon.³³³ The proposed Virginia program closely follows RGGI.³³⁴ If the Pennsylvania reserve price is set too high and trading is allowed, this may reduce the number of allowances that buyers will purchase from Pennsylvania, significantly depleting the income to be received by the trust beneficiaries. Therefore, Pennsylvania could initially establish a reserve price more consistent with California's reserve price. All of the other state trading programs call for reductions in the caps, increases in the reserve prices, and increases in the triggers for releasing cost containment reserves, such that the prices will approach the social price of carbon.³³⁵ Moreover, because the social cost of carbon increases significantly if action imposing an adequate price on emissions is delayed,³³⁶ accepting a lower price today will mean that the price to be paid eventually will be higher.³³⁷ Thus, the rule of prudence provides the Commonwealth with flexibility.

VII. BLOCKING ACTION BY THE GENERAL ASSEMBLY PREVENTING IMPLEMENTATION OF GHG REGULATION

Perhaps the clearest implication of the *PEDF* and *Robinson Township* decisions is that Article I, § 27 may be relied upon to invalidate actions by the General Assembly aimed at blocking the implementation of regulations establishing meaning-

332. CAL. CODE REGS. tit. 17, § 95911(c) (2017); RGGI Model Rule § XX-1.2 (2017) (definition of "minimum reserve price"), https://rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf.

333. CAL. CODE REGS. tit. 17, § 95913 (2017); RGGI Model Rule §§ XX-1.2 (2017) (definition of "CO₂ cost containment reserve allowance or CO₂ CCR allowance"), XX-9.2(b), https://rggi.org/sites/default/files/Uploads/Program-Review/12-19-2017/Model_Rule_2017_12_19.pdf.

334. See Regulation for Emissions Trading Programs, *supra* note 243.

335. Arguably, the RGGI and California-Quebec-Ontario reserve prices are currently too low to drive necessary reductions, since the social cost of carbon is based on the economically efficient marginal cost of the damage averted. Because the allowance prices obtained in RGGI auctions have been insufficient even to prevent existing nuclear facilities from premature closure, New York promulgated regulations requiring that electricity distribution companies purchase ZECs based on the social cost of carbon from existing nuclear generation units to put a sufficient value on their emissions-free electricity. The New York Clean Energy Standard, upheld in *Coal. for Competitive Elec. v. Zibelman*, 272 F. Supp. 3d 554, 561 (S.D.N.Y. 2017), *appeal filed* (2d Cir. Aug. 25, 2017) (quoting CES Order, app. E, at 1), was designed to further New York's policy to reduce GHG emissions by preserving existing emissions free electricity provided by New York's nuclear plants and by encouraging the development of additional emissions-free electricity from renewable generation sources. It was motivated, in part, by the announcements that the Fitzpatrick and Ginna nuclear plants would close due to financial stresses caused by low electricity prices created by the oversupply of natural gas from shale gas resources, as well as by the failure of the RGGI prices to impose sufficient costs for CO₂ emissions from fossil-fired electricity generation. *Id.* at 562, n.5.

336. Daniel et al., *supra* note 327, at 38-39; see also Litterman, *supra* note 331; Litterman, Daniel & Wagner, *supra* note 218, at 43.

337. Increasing prices in later years, when there is a lower cap, will help maintain total revenues.

ful limits on GHG emissions. The General Assembly can exercise a variety of powers to attempt to block the adoption of regulations limiting emissions of GHGs and having the effect of putting a price on those emissions.³³⁸ The General Assembly could also seek to block those regulations through its appropriations power or by adopting legislation repealing the regulations and removing the EQB's authority to regulate.

Robinson Township invalidated legislation that removed powers from municipalities and the DEP that allowed those municipalities and the DEP to exercise their duties as trustees.³³⁹ *PEDF*'s holding makes it clear that the Commonwealth's duty as a trustee applies to all types of actions, including appropriations. *PEDF* could be relied upon to invalidate the General Assembly's action, just as the transfer of funds through the budget process was invalidated in *PEDF*. Even the *Funk* decision recognized that the ERA could be used to invalidate legislation that impaired rights guaranteed by the ERA.³⁴⁰

Legislation blocking a regulation required to "maintain and conserve" a stable climate, repealing such a regulation, replacing a regulation with a weaker version that did not maintain and conserve a stable climate, or removing the power to regulate GHGs from the EQB would all likely be unconstitutional violations of the ERA under the reasoning in *PEDF* and *Robinson Township*.

CONCLUSION

The precise contours of Article I, § 27 rights, enunciated in *Robinson Township* and *PEDF*, as they relate to GHG regulation and emissions pricing have not been litigated. Nevertheless, those opinions provide substantial support both for meaningful regulation of GHG emissions by Pennsylvania and for a regulated emissions

338. For example, the General Assembly might adopt legislation such as the Pennsylvania Greenhouse Gas Regulation Implementation Act, 71 PA. CONS. STAT. §§ 1362.1-1362.4 (2014), where the General Assembly required legislative review of Pennsylvania's submission of its implementation plan for the Clean Power Plan. Unless the Act is construed to make it constitutional, it provides a possible mechanism for an unconstitutional one-house veto of the plan. See PA. CONST. art. I, § 27 (stating that Pennsylvania's natural resources are a public trust), art. IV, §§ 9, 15 (requiring passage of laws, resolutions and votes by both houses and presentment to the governor); *Commonwealth v. Sessoms*, 516 Pa. 365, 532 A.2d. 775 (1987) (invalidating legislative veto); *MCT Transp., Inc. v. Phila. Parking Auth.*, 60 A.3d 899 (Pa. Commw. Ct. 2013) (holding that approval of a rule under a similar procedure did not constitute valid legislative action consistent with separation of powers principles and specifically disapproving of the process as a one-house veto). The General Assembly might also attempt to invalidate a regulation pursuant to the process prescribed in the Regulatory Review Act, 71 PA. CONS. STAT. §§ 745.1-745.15 (1982).

339. *Robinson Twp. v. Commonwealth*, 83 A.3d 901, 977-85 (Pa. 2013).

340. *Funk cited Cmty. Coll. of Delaware Cty. v. Fox*, 20 Pa. Commw. 335, 342 A.2d 468, 473 (1975) for the proposition that the ERA "could operate only to limit such powers as had been expressly delegated by proper enabling legislation." *Funk v. Wolf*, 144 A.3d 228, 249 (Pa. Commw. Ct. 2016), *aff'd without opinion*, 158 A.3d 642 (Pa. 2017) (emphasis in *Funk*).

price sufficient to put the Commonwealth on a path to deep decarbonization and economic modernization.

If these decisions are extended to support an Article I, § 27 mandate to regulate GHGs as suggested here, that extension can also have national and international significance. Many states and nations have similar provisions in their constitutions or public trust doctrines, and the scholarly constitutional jurisprudence of the Pennsylvania Supreme Court may be persuasive to these other jurisdictions.