Regulatory Analysis Form

(Completed by Promulgating Agency)

(All Comments submitted on this regulation will appear on IRRC's website)

INDEPENDENT REGULATORY REVIEW COMMISSION

(1) Agency:
Environmental Protection

(2) Agency Number: 7
Identification Number: 559

IRRC Number: 3274

(3) PA Code Cite: 25 Pa. Code Chapter 145, Subchapter E

(4) Short Title: CO_2 Budget Trading Program

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(6) Type of Rulemaking (check applicable box):

- ☐ Proposed Regulation
- ☒ Final Regulation
- ☐ Final Omitted Regulation
- ☐ Emergency Certification Regulation;
- ☐ Certification by the Governor
- ☐ Certification by the Attorney General

(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)

The Environmental Quality Board (Board) amends Chapter 145 (relating to interstate pollution transport reduction) to read as set forth in Annex A. This final-form rulemaking would add Subchapter E (relating to CO_2 budget trading program) to establish a program to limit the emissions of carbon dioxide (CO_2) from fossil fuel-fired electric generating units (EGUs) located in this Commonwealth, with a nameplate capacity equal to or greater than 25 megawatts (MWe). This final-form rulemaking includes a declining annual CO_2 emissions budget, which starts at 78,000,000 tons in 2022 and ends at 58,085,040 tons in 2030. This is anticipated to reduce CO_2 emissions in this Commonwealth by 31% compared to 2019. This final-form rulemaking would result in CO_2 emission reductions from sources within this Commonwealth of 97—227 million short tons by 2030, improving the health and welfare and the environment of this Commonwealth, including communities most impacted by marginal air quality. This final-form rulemaking would also establish the Commonwealth's participation in the Regional Greenhouse Gas Initiative (RGGI), a regional CO_2 Budget Trading Program.

(8) State the statutory authority for the regulation. Include <u>specific</u> statutory citation.

This final-form rulemaking is authorized under section 5(a)(1) of the Air Pollution Control Act (APCA) (35 P.S. § 4005(a)(1)), which grants the Board the authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. Section 6.3(a) of the APCA (35 P.S. § 4006.3(a)) also authorizes the Board by regulation to establish fees to support the air pollution control program authorized by this act and not covered by fees required by section 502(b) of the Clean Air Act (CAA) (42 U.S.C.A. § 7661a(b)).

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

While this final-form rulemaking is not mandated by any Federal or State law or court order, CO_2 is a regulated air pollutant under the APCA and the Federal CAA. This Commonwealth's courts have found that the regulation of air pollution has long been a valid public interest. *See e.g., Bortz Coal Co., v. Commonwealth*, 279 A.2d 388, 391 (Pa. Cmwlth. 1971); *DER v. Pennsylvania Power Co.*, 384 A.2d 273, 284 (Pa. Cmwlth. 1978); *Commonwealth v. Bethlehem Steel Corporation*, 367 A.2d 222, 225 (Pa. 1976). Moreover, the Commonwealth Court has endorsed the Department's position that the General Assembly, through the APCA, gave the agency the authority to reduce greenhouse gas (GHG) emissions, including CO_2. *Wolf v. Funk*, 144 A.3d 228, 250 (Pa. Cmwlth. 2016). In *Massachusetts v. EPA*, 549 U.S. 497 (2007) the U.S. Supreme Court recognized that similarly broad language in the CAA authorized the United States Environmental Protection Agency (EPA) to regulate CO_2 emissions under the CAA.

On December 15, 2009, under CAA section 202(a)(1), (42 U.S.C.A. § 7521(a)(1)), the EPA issued an "Endangerment Finding," that six GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride—endanger both the public health and the public welfare of current and future generations by causing or contributing to climate change. See 74 FR 66496 (December 15, 2009). The EPA's 2009 endangerment finding particularly concerned GHG emissions released from motor vehicles. However, in 2015, the EPA issued an endangerment finding for GHG emissions released from new EGUs through the promulgation of its regulation concerning "Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units." See 80 FR 64509 (October 23, 2015). On January 19, 2021, the D.C. Circuit Court of Appeals affirmed that the endangerment finding issued for new EGUs provided a sufficient basis for the EPA's regulation controlling GHG emissions from existing EGUs, commonly known as the "Affordable Clean Energy Rule or ACE rule" in its decision vacating the rule and remanding it back to the EPA. See *Am. Lung Ass'n v. Env't Prot. Agency*, 985 F.3d 914, 977 (D.C. Cir. 2021). In other words, the EPA made a source-specific finding that GHG emissions, principally CO_2, from EGUs endanger public health and welfare and cause or contribute to climate change.

On October 3, 2019, Governor Tom Wolf signed Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*,[1] codified at 4 Pa. Code §§ 7a.181—7a.183, which directed the Department to use its existing authority under the APCA to develop a rulemaking to abate, control, or limit CO_2 emissions from fossil fuel-fired electric power generators. This final-form rulemaking establishes a CO_2 budget consistent in stringency to that established by the states participating in RGGI ("participating states"), provides for the annual or more frequent auction of CO_2 emissions allowances through a market-based mechanism, and is sufficiently consistent with the RGGI Model Rule such that CO_2 allowances may be traded with holders of allowances from other states.

While the Department developed this final-form rulemaking under the direction of Executive Order 2019-07, the Board has the authority to promulgate this final-form rulemaking under the APCA. Through the APCA, the Legislature granted the Department and the Board the authority to protect the air resources of this Commonwealth, which is inclusive of controlling CO_2 pollution. CO_2 falls under the definition of "air pollution" in section 3 of the APCA (35 P.S. § 4003). The Board has the authority under section 5(a)(1) of the APCA to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. As mentioned in the response to question 10, numerous sources,

[1] Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, October 3, 2019, https://www.oa.pa.gov/Policies/eo/Documents/2019-07.pdf.

including the EPA, the Penn State University, the U.S. Global Change Research Program (USGCRP) and the International Panel on Climate Change (IPCC), have confirmed that CO_2 emissions cause harmful air pollution that is inimical to the public health, safety and welfare, as well as human, plant and animal life. CO_2 is also a GHG and the largest contributor to climate change. Thus, regulating sources of CO_2 emissions is necessary to protect the public health and welfare from harmful air pollution and address climate change.

(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

According to data from the United States Energy Information Administration (EIA), this Commonwealth generates the fifth most CO_2 emissions from EGUs in the country.[2] Since CO_2 emissions are a major contributor to regional climate change impacts, the Department developed this final-form rulemaking to establish this Commonwealth's participation in a regional approach that significantly reduces CO_2 emissions and this Commonwealth's contribution to regional climate change.

The purpose of this final-form rulemaking is to reduce anthropogenic emissions of CO_2, a GHG, and major contributor to climate change impacts, in a manner that is protective of public health, welfare and the environment in this Commonwealth. This final-form rulemaking would reduce CO_2 emissions from sources within this Commonwealth and establish the Commonwealth's participation in RGGI, a regional CO_2 Budget Trading Program aimed at reducing CO_2 emissions from the power sector. This final-form rulemaking would establish a CO_2 Budget Trading Program for this Commonwealth which is capable of linking with similar regulations in the participating states. These independently promulgated and implemented CO_2 Budget Trading Program regulations together make up the regional CO_2 Budget Trading Program or "RGGI."

This final-form rulemaking would effectuate least cost CO_2 emission reductions for the years 2022 through 2030. The declining CO_2 Emissions Budget in this final-form rulemaking directly results in CO_2 emission reductions of around 20 million short tons in this Commonwealth as well as emission reductions across the broader PJM regional electric grid. However, the Department projects that 97—227 million short tons of CO_2 that would have been emitted over the next decade will not be emitted by sources within this Commonwealth by this Commonwealth's participation in RGGI.

If this Commonwealth participates in RGGI in 2022, combined with the other participating states and based on gross domestic product (GDP), RGGI would be equal to the third largest economy in the world. When viewed from this collective impact, the CO_2 emission reductions achieved by the participating states are even more significant. Reductions in CO_2 emissions will help decrease the adverse impacts of climate change on human health, the environment and the economy. Specifically, CO_2 emission reductions may decrease costs from extreme weather events and climate-related ailments that also result in increased health care costs, as well as missed school and workdays due to illness.

The CO_2 emission reductions accomplished through implementation of this final-form rulemaking would benefit the health and welfare of the approximately 12.8 million residents and the numerous animals, crops, vegetation and natural areas of this Commonwealth by reducing the amount of climate change causing air pollution resulting from the regulated sources.

[2] EIA, Energy-Related Carbon Dioxide Emissions by State, 2005-2016, February 27, 2019, https://www.eia.gov/environment/emissions/state/analysis/.

Climate Change Impacts and the Greenhouse Effect

Like every state in the country, this Commonwealth has already begun to experience adverse impacts from climate change, such as higher temperatures, changes in precipitation, and frequent extreme weather events, including large storms, flooding, heat waves, heavier snowfalls, and periods of drought. These impacts could alter the many fundamental assumptions about climate that are intrinsic to this Commonwealth's infrastructure, governments, businesses and the stewardship of its natural resources and environment. If not properly accounted for, changes in climate could result in more frequent road washouts, higher likelihood of power outages, and shifts in economic activity, among other significant impacts. Climate change can also affect vital determinants of health such as clean air, safe drinking water, sufficient food and secure shelter. These vital determinants are particularly affected by the increased extreme weather events, in addition to decreased air quality and an increase in illnesses transmitted by food, water, and disease carriers such as mosquitos. If these impacts are to be avoided, GHG emissions must be reduced expeditiously.

The impacts of climate change are vast and what was predicted ten years ago is being confirmed today. Climate change is being caused by the emission and atmospheric concentration of GHGs, namely, but not exclusively, CO_2. Scientists have confirmed that increased CO_2 emissions from human activity are causing changes to global climate. Of all the actively publishing climate scientists, 97% agree that climate warming trends over the past century are extremely likely due to human activities. Major scientific institutions including the U.S. National Academy of Sciences, the USGCRP, the American Medical Association, the American Association for the Advancement of Science, and many others endorse this position. In the Fifth Assessment Report of the IPCC released in 2014, the IPCC concluded that, "human influence on the climate system is clear, and recent anthropogenic emissions of GHGs are the highest in history."[3]

While CO_2 is a necessary element of life on Earth and acts as a fundamental aspect of nearly every critical system on the planet, CO_2 in high concentrations in the atmosphere leads to the greenhouse effect. The greenhouse effect occurs when CO_2 (and other GHG) molecules absorb solar energy and re-emit infrared energy back to the Earth's surface. This absorption and re-emitting of infrared energy is what makes certain gases trap heat in the lower atmosphere, not allowing it to go back out to space. The greenhouse effect disrupts the normal process whereby solar energy is absorbed at the Earth's surface and is radiated back through the atmosphere and back to space. Maintaining the surface temperature of the Earth depends on this balance of incoming and outgoing solar radiation.[4]

Global temperatures are increasing due to the greenhouse effect. Significantly changing the global temperature has impacts to every other weather and climate cycle occurring across the world. For instance, global average sea level, which has risen by about 7–8 inches since 1900 (with about 3 inches of that increase occurring since 1993), is expected to rise at least several inches in the next 15 years and by 1–4 feet by 2100.[5] The impacts of increased GHGs in the atmosphere, including extreme weather and catastrophic natural disasters, have become more frequent and more intense. Extreme weather events also contribute to deaths from extreme heat or cold exposure and lost work hours due to illness. The World Health Organization expects climate change to cause around 250,000 additional deaths globally per year between 2030-2050, with additional direct damage costs to health estimated to be around $2-4 billion per

[3] IPCC, Climate Change 2014: Synthesis Report, Contribution of Working Groups I, II and III to the *Fifth Assessment Report of the Intergovernmental Panel on Climate Change*, 2014, https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf

[4] National Aeronautics and Space Administration, "The Causes of Climate Change," https://climate.nasa.gov/causes/.

[5] U.S. Climate Resilience Toolkit, Sea Level Rise, September 19, 2019, https://toolkit.climate.gov/topics/coastal/sea-level-rise.

year by 2030.[6] Based on the overwhelming scientific evidence, these harms are likely to increase in number and severity unless aggressive steps are taken to reduce GHG emissions.

Climate Change Impacts Assessments

Since 2009, the Department has released Climate Change Impacts Assessments, as required under the Pennsylvania Climate Change Act (71 P.S. §§ 1361.1—1361.8), which have underscored the critical need to take action to reduce GHG emissions and address climate change. On May 5, 2021, the Department with support from ICF and Penn State University, released the most recent Pennsylvania Climate Impacts Assessment.[7] The 2021 Pennsylvania Climate Impacts Assessment found that the average annual temperature Statewide will continue to rise and is expected to increase by 5.9°F (3.3°C) by midcentury compared to a baseline period of 1971-2000. Additionally, this Commonwealth could experience more total average rainfall, occurring in less frequent but heavier rain events. Extreme rainfall events are projected to increase in magnitude, frequency, and intensity, while drought conditions are also expected to occur more frequently due to more extreme, but less frequent precipitation patterns.

There will also be more frequent and intense extreme heat events with temperatures expected to reach at least 90°F on 37 days per year on average across the State, up from the 5 days during the baseline period. Days reaching temperatures above 95°F and 100°F will become more frequent as well. These increasing temperatures will continue to alter the growing season and increase the number of days that individuals and businesses will have to run air conditioning. As heat waves become increasingly common, individuals will be more susceptible to health and economic risks. This is particularly true for vulnerable populations, including low-income populations, the elderly, pregnant women, people with certain mental illnesses, outdoor workers, and those with cardiovascular conditions. Most notable from the 2021 Pennsylvania Climate Impacts Assessment is that climate change will not affect all Pennsylvanians equally. Some may be more at risk because of their location, income, housing, health, or other factors. As shown by all of the Pennsylvania Climate Change Impacts Assessments, climate risks and related impacts in Pennsylvania could be severe, potentially causing increased infrastructure disruptions, higher risks to public health, economic impacts, and other changes, unless actions are taken by the Commonwealth to avoid and reduce the consequences of climate change.

In April 2020, the Environment and Natural Resources Institute at Penn State University released an updated Climate Change Impacts Assessment[8] for the Department, which states that the expected disruptions to this Commonwealth's climate and impacts on this Commonwealth's climate sensitive sectors remain as dire as presented in the 2015 Climate Change Impacts Assessment. The 2015 Climate Change Impacts Assessment[9] found that this Commonwealth has undergone a long-term warming of more than

[6] World Health Organization, *Climate change and health*, February 1, 2018, https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health.

[7] ICF and The Pennsylvania State University, 2021 Pennsylvania Climate Impacts Assessment, May 2021, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=3667348&DocName=PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%202021.PDF%20%20%3cspan%20style%3D%22color:green%3b%22%3e%3c/span%3e%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e%204/30/2023

[8] Environment and Natural Resources Institute of The Pennsylvania State University, 2020 Pennsylvania Climate Change Impacts Assessment Update, April 2020, http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf.

[9] Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20.

1.8°F over the prior 110 years, and that due to increased GHG emissions, current warming trends are expected to increase at an accelerated rate with average temperatures projected to increase an additional 5.4 degrees by 2050. This warming will have potential adverse impacts related to agriculture, forests, aquatic ecosystems, water resources, wildlife and public health across this Commonwealth. In this Commonwealth, average annual precipitation has increased by approximately 10% over the past 100 years and, by 2050, is expected to increase by an additional 8%, with a 14% increase during the winter season. In particular, climate change will worsen air quality relative to what it would otherwise be, causing increased respiratory and cardiac illness. Air quality impacts from climate change are due to the combination of pollutants emitted from anthropogenic sources and weather conditions. Climate change can potentially also worsen water quality, affecting health through consumption of diminished quality drinking water and through contact with surface waters during outdoor recreation. The risk of injury and death from extreme weather events could also increase as a consequence of climate change. Additionally, climate change could affect the prevalence and virulence of air-borne infectious diseases such as influenza.

In 2009, the Department released its first Climate Change Impacts Assessment[10] which showed that this Commonwealth was already experiencing some of the harmful effects of climate change. That same year, under CAA section 202(a)(1), 42 U.S.C.A. § 7521(a)(1), the EPA issued an "Endangerment Finding," that six GHGs — CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride — endanger both the public health and the public welfare of current and future generations by causing or contributing to climate change. See 74 FR 66496 (December 15, 2009). The EPA's 2009 endangerment finding particularly concerned GHG emissions released from motor vehicles. However, in 2015, the EPA issued an endangerment finding for GHG emissions released from new EGUs through the promulgation of its regulation concerning "Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units." See 80 FR 64509 (October 23, 2015). On January 19, 2021, the D.C. Circuit Court of Appeals affirmed that the endangerment finding issued for new EGUs provided a sufficient basis for the EPA's regulation controlling GHG emissions from existing EGUs, commonly known as the "Affordable Clean Energy Rule or ACE rule" in its decision vacating the rule and remanding it back to the EPA. See *Am. Lung Ass'n v. Env't Prot. Agency*, 985 F.3d 914, 977 (D.C. Cir. 2021). In other words, the EPA made a source-specific finding that GHG emissions, principally CO_2, from EGUs endanger public health and welfare and cause or contribute to climate change. Additionally, the EPA's Endangerment Findings are further reinforced by the findings of the USGCRP's Fourth National Climate Assessment (NCA4) which is consistent with the Commonwealth's 2015, 2020, and 2021 Climate Change Impacts Assessments. While these Federal studies inform the Department's decision to regulate CO_2 emissions within this Commonwealth, they are not determinative because this final-form rulemaking is being promulgated by the Board under the authority of the APCA, not the CAA.

On November 23, 2018, the USGCRP released the NCA4,[11] a scientific assessment of the national and regional impacts of natural and human-induced climate change. The NCA4 represents the work of over 300 government and non-government experts, led by experts within the EPA, the U.S. Department of Energy and eleven other federal agencies. The NCA4 shows how the impacts of climate change are already occurring across the country and emphasizes that future risks from climate change will depend on the decisions made today. It is worth noting that the NCA4 mentions that the Northeast region is a model for other states, as it has traditionally been a leader in GHG mitigation action.

[10] Environment and Natural Resources Institute of The Pennsylvania State University, 2009 Pennsylvania Climate Impacts Assessment Update, June 29, 2009, http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/7000-BK-DEP4252%5B1%5D.pdf.

[11] USGCRP, Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, 2018, https://nca2018.globalchange.gov/.

By 2035, the NCA4 projects that the Northeast will see the largest temperature increase in the country of more than 3.6°F on average higher than the preindustrial era.[12] This would occur as much as two decades before global average temperatures reach a similar milestone. The changing climate of the Northeast threatens the health and public welfare of its residents and will lead to health-related impacts and costs, including additional deaths, emergency room visits and hospitalizations, higher risk of infectious diseases, lower quality of life and increased costs associated with healthcare utilization. Mosquitoes, fleas and ticks and the diseases they carry have been a particular concern in the Northeast in recent years. Scientists have linked these diseases, specifically tick-related Lyme disease, to climate change.

Climate change also threatens to reverse the advances in air quality that the states in the Northeast, including this Commonwealth, have worked so hard to achieve over the past couple of decades. In particular, climate change will increase levels of ground-level ozone pollution in the Northeast through changes in weather and increased ozone precursor emissions. Ozone is an irritant and repeated exposure to ozone pollution for both healthy people and those with existing conditions may cause a variety of adverse health effects, including difficulty in breathing, chest pains, coughing, nausea, throat irritation and congestion. In addition, people with bronchitis, heart disease, emphysema, asthma and reduced lung capacity may have their symptoms exacerbated by ozone pollution. Asthma, in particular, is a significant and growing threat to children and adults in this Commonwealth. The NCA4 refers to this as a "climate penalty" and projects it could cause hundreds more ozone pollution-related deaths per year.

Over the past several decades, the Department has made substantial progress in decreasing ground-level ozone pollution in this Commonwealth, including limiting precursor emissions. However, Bucks, Chester, Delaware, Montgomery and Philadelphia counties are designated as marginal nonattainment areas for the 2015 ozone national ambient air quality standards (NAAQS). See 83 FR 25776 (June 4, 2018). There is still more work that needs to be done to reduce emissions in these nonattainment areas and to avoid backsliding on the improvements to air quality across this Commonwealth. An increase in ground-level ozone levels due to climate change would interfere with continued attainment of the ozone NAAQS, hinder progress in marginal nonattainment areas and put public health and welfare at risk.

Along with these overall impacts, multiple sectors in this Commonwealth can expect to see specific negative impacts from climate change.

Health

Climate change will impact human health in a number of ways. It will likely increase ground-level ozone, small airborne particulates, and pollen and mold concentrations. Ozone is an irritant that causes respiratory issues, aggravates asthma, causes respiratory infections, and increases mortality. Higher plant growth, more pollen produced by each plant, increased allergenicity of the pollen grains, and a longer pollen season can also be expected. In this Commonwealth, mosquito and tick-borne diseases are spreading to new communities and regions and impacting people's lives.[13] According to a recent Penn State University study,[14] since 2000, this Commonwealth has had the highest number of total Lyme disease cases

[12] *Id.* at Chapter 18: Northeast.
[13] Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20.
[14] Pennsylvania State University, More than 100 years of data show Pennsylvania tick population shift, May 3, 2019, https://phys.org/news/2019-05-years-pennsylvania-population-shift.html

nationwide. Increased deer tick prevalence throughout this Commonwealth is related to climate change and shifts in land use because winters are no longer cold enough to kill off tick populations.

Vulnerable populations across this Commonwealth will be at a higher risk for heat related death. People with heart failure, the elderly, and those without access to air conditioning will all be increasingly exposed to more frequent and intense heat waves. One study found that if temperatures increase another 3 degrees, cities like Philadelphia will see hundreds more deaths per year than if warming is limited to 1 degree.[15]

Repeated exposure to ozone pollution for both healthy people and those with existing conditions may cause a variety of adverse health effects including difficulty breathing, chest pains, coughing, nausea, throat irritation, and congestion. In addition, people with bronchitis, heart disease, emphysema, asthma, and reduced lung capacity may have their symptoms exacerbated by ozone pollution. Asthma is a significant and growing threat to children and adults in this Commonwealth. The threat of asthma is particularly pronounced in Philadelphia, which has especially high asthma prevalence and hospitalization rates – affecting approximately one out of four children in West Philadelphia alone. Asthma disproportionately affects African Americans and those below or near the poverty line, highlighting key environmental justice considerations for pollution control.[16] Reduced ambient concentrations of ground-level ozone would reduce the incidences of hospital admissions for respiratory ailments including asthma and improve the quality of life for residents of this Commonwealth.[17]

According to the NCA4, climate-driven changes in weather, human activity and natural emissions are all expected to impact future air quality across the United States. Many emission sources of GHGs also emit air pollutants that harm human health. Controlling these common emission sources would both mitigate climate change and have immediate benefits for air quality and human health. The energy sector, which includes energy production, conversion, and use, accounts for 84% of GHG emissions as well as 80% of emissions of oxides of nitrogen (NO_x) and 96% of sulfur dioxide (SO_2). Specifically, mitigating GHGs can lower emissions of particulate matter (PM), ozone and PM precursors, and other hazardous pollutants, reducing the risks to human health from air pollution.

Agriculture

In addition to causing adverse human and animal health effects, high levels of ground-level ozone affect vegetation and ecosystems, leading to reductions in agricultural crop and commercial forest yields by destroying chlorophyll; reducing growth and survivability of tree seedlings; and increasing plant susceptibility to disease, pests, and other environmental stresses, including harsh weather. In long-lived species, these effects may become evident only after several years or even decades and have the potential for long-term adverse impacts on forest ecosystems.[18]

[15] University of Bristol, Adjusting carbon emissions to the Paris climate commitments would prevent thousands of heat-related deaths, June 5, 2019, http://www.bristol.ac.uk/news/2019/june/heat-related-deaths-.html.
[16] EPA Region 3, EPA Mid-Atlantic Recognizes First Asthma Community Champion, May 2021, https://www.epa.gov/newsreleases/epa-mid-atlantic-recognizes-first-asthma-community-champion.
[17] EPA, Health Effects of Ground-Level Ozone, http://web.archive.org/web/20160220023128/http://www3.epa.gov/airquality/ozonepollution/health.html.
[18] Environment and Natural Resources Institute of The Pennsylvania State University, 2013 Pennsylvania Climate Impacts Assessment Update, October 2013, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=6806&DocName=PA%20DEP%20CLIMATE%20IMPACT%20ASSESSMENT%20UPDATE.PDF%20%20%3Cspan%20style%3D%22color%3Agreen%3B%22%3E%3C%2Fspan%3E%20%3Cspan%20style%3D%22color%3Ablue%3B%22%3E%3C%2Fspan%3E.

Similar to various public health pressures, the agricultural, food, and water systems this Commonwealth depends on for survival are also under threat by climate change. The increase in precipitation and its variability could lead to higher plant disease, increased risk of flooding, difficulty in the timing of planting, and increased demand for irrigation. Extreme temperatures will stress grain crops and fruit crops that flower in the summer months (such as grapes). To adapt, this Commonwealth's wineries may choose to plant European varieties of grapes, which tend to do better in warmer climates, but this would also lead to increases in the cost of wine.[19]

This Commonwealth's dairy production will also experience challenges from reduced milk yields, a result of heat stress on cows. Farmers may see additional capital expenditures necessary for cooling systems to reduce the heat stress on cows. The same is true for poultry and egg production. Investments in insulation, ventilation, fans, and air conditioning will be necessary to prevent heat stress to the birds. Currently, a large portion of poultry and hog production takes place in warmer, southern states like North Carolina and Georgia, showing that these production processes can still be viable with the increased costs of cooling. However, there may be a northward movement of these animals, bringing with them an increase in nutrient production and further stressing our obligations for water quality improvements.[20]

High levels of ground-level ozone also affect animals including pets, livestock, and wildlife, in ways similar to humans. Reduced ambient concentrations of ground-level ozone would improve the quality of life of animals, preserve this Commonwealth's biodiversity, and reduce veterinary costs to farmers and citizens with pets.

Forests & Recreation

Climate change is already having an impact on forests around the world and this Commonwealth's diverse and productive forests will likely also see impacts. Tree species are expected to shift to higher latitudes and elevations for suitable habitat. Mortality rates are expected to increase, and regeneration is expected to decline. Rising temperatures increase insect reproductive rates, making pest outbreaks more destructive and harder to control. Additionally, pests that impact the forests of southern states could make their way into this Commonwealth's forests.

Outdoor recreation in this Commonwealth will also be impacted by climate change. Stream flows in the summer could be reduced and negatively affect sport fishing. Swimming in lakes and rivers could be limited by poor water quality, the result of higher temperatures, low summer flows, and nutrient and pathogen loadings. These combinations of circumstances can lead to harmful algal blooms.

Warmer winter temperatures and reduced snowfall will negatively impact snow-based recreation. This Commonwealth's ski resorts will experience shorter seasons, higher snow making costs, and lower profits as a consequence of climate change. Research also suggests that dispersed winter recreation, such as cross-country skiing and snowmobiling, will decline because of less snowfall and fewer extended periods of cold weather.[21]

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[19] *Id.*

[20] Environment and Natural Resources Institute of The Pennsylvania State University, 2009 Pennsylvania Climate Impacts Assessment Update, June 29, 2009, http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/7000-BK-DEP4252%5B1%5D.pdf.

[21] Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20.

Infrastructure

Extreme weather events can affect the reliability of energy delivery. Hurricanes, polar vortexes, and ice storms can damage infrastructure. Increased cooling demands can also stress energy delivery systems during times of high demand and could lead to electrical blackouts. Planning for distributed generation to provide electricity in the event of natural disaster related outages becomes necessary.

The Commonwealth's infrastructure system has recently experienced major impacts from increased precipitation and the resultant landslides, as 2018 was the wettest year on record.[22] In just one year, PennDOT saw over $125 million in emergency expenses to replace damaged infrastructure and cash-strapped local municipalities are dealing with the same budget-busting issues. Adding to that financial stress, many flooding events are so localized that they do not qualify for Federal assistance, so homeowners, business owners, and local and state agencies must bear the brunt of repair costs.

Water Resources

The Department predicts higher flood potential due to more precipitation and intensified risks to water resources that are already stressed. Other potential impacts are decreased water quality, urban flooding, decreased water supplies for urban areas, and irrigation. Warmer temperatures may mean less winter thermal stress on fish, but higher summer temperatures could have an impact on salmon spawning. More severe storm events and dry periods will change flow patterns, resulting in major changes to the channel morphology and aquatic habitat. The largest negative impact may be in lost biodiversity as fish and other species' populations shift northward.

Additionally, the Department predicts that water temperatures in the summer could increase 2.7 to 3.5 degrees. This warming will cause a decrease in the solubility of oxygen and an increase in respiration rates, resulting in decline of the dissolved oxygen concentration. By mid-century, the sea level will increase by 0.4 meters. Coupled with the projected summer stream flow decrease of 19%, a modest increase of salinity is expected to occur.[23] Salinity is an important defining characteristic of the Delaware estuary, regulating floral and faunal distributions and affecting human use of the estuary. While salinity is a threat, the predicted sea-level rise has the potential to drown the already-stressed wetlands if their growth rates are less than the rates of the rise.[24]

Immediate Action is Needed to Address this Commonwealth's Contribution to Climate Change

Given the urgency of the climate crisis, including the significant impacts on this Commonwealth, the Board determined that concrete, economically sound and immediate steps to reduce GHG emissions are needed. As one of the top GHG emitting states in the country, the Board has a compelling interest to reduce GHG emissions to address climate change and protect public health, welfare and the environment. Based on the most recent data from the EPA's State Inventory Tool, in 2017, this Commonwealth generated net GHG emissions equal to 233.20 million metric tons CO_2 equivalent (MMTCO2e) Statewide,

[22] National Weather Service: National Oceanic and Atmospheric Administration, 2018 in Context: Record Precipitation across Pennsylvania, https://www.weather.gov/ctp/RecordPrecip2018.

[23] Environment and Natural Resources Institute of The Pennsylvania State University, 2015 Pennsylvania Climate Impacts Assessment Update, May 2015, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=5002&DocName=2015%20PENNSYLVANIA%20CLIMATE%20IMPACTS%20ASSESSMENT%20UPDATE.PDF%20.

[24] *Id.*

the vast majority of which are CO_2 emissions. In the context of the world, this Commonwealth's electricity generation sector alone emits more CO_2 than many entire countries including Greece, Sweden, Israel, Singapore, Austria, Peru and Portugal.[25]

Historically, the electricity generation sector has been the leading source of CO_2 emissions in this Commonwealth. Based upon data contained in the Department's 2020 GHG Inventory, 29% of this Commonwealth's total GHG emissions are produced by the electricity generation sector.[26] The Department's GHG inventory and related information is available at https://www.dep.pa.gov/Citizens/climate/Pages/CCAC.aspx. In recent years, this Commonwealth has seen a shift in the electricity generation portfolio mix, resulting from market forces and the establishment of alternative energy goals, and energy efficiency targets. Since 2005, this Commonwealth's electricity generation has shifted from higher carbon-emitting electricity generation sources, such as coal, to lower and zero emission generation sources, such as natural gas, wind and solar. At the same time, overall energy use in the residential, commercial, transportation, and electric power sectors has reduced.

However, looking forward, the Department projects CO_2 emissions from the electricity generating sector will increase due to reduced switching from coal to natural gas, the potential closure of zero carbon emitting nuclear power plants, and the addition of new natural gas-fired units in this Commonwealth. The Three Mile Island nuclear power plant already closed on September 20, 2019, amounting to a loss of 818 MW of carbon free generation. However, the modeling conducted for this final-form rulemaking predicts no further nuclear power plants retirements through 2030 with implementation of this final-form rulemaking. Without this final-form rulemaking, this Commonwealth's nuclear fleet may remain at-risk of closure. In fact, on March 13, 2020, Energy Harbor, the owner of the Beaver Valley nuclear power plant, responsible for 1,845 MW of carbon free generation, withdrew its closure announcement, specifically citing this Commonwealth's intended participation in RGGI as a key determinant in continuing operations.

Further, the Department's Climate Action Plan predicts that total and net GHG emissions (including emissions sinks) will increase by 4% and 5%, respectively, from 2015 to 2050.[27] Additionally, the most recent GHG Inventory indicates that in 2017 GHG emissions in this Commonwealth increased, widening the gap between current emissions and reductions necessary to avoid the worst impacts of climate change.[28]

This final-form rulemaking is necessary to ensure CO_2 emissions continue to decrease and at a rate that shields this Commonwealth from the worst impacts of climate change. RGGI plays an important role in providing a platform whereby this Commonwealth can reduce CO_2 emissions using a market-based approach. As the electricity generation sector remains one of the leading sources of CO_2 in this Commonwealth, it is imperative that emissions continue to decrease from that sector.

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[25] Joint Research Centre, European Commission, "JRC Science for Policy Report: Fossil CO_2 emissions of all world countries," 2020, https://publications.jrc.ec.europa.eu/repository/handle/JRC121460

[26] Environment and Natural Resources Institute of The Pennsylvania State University, 2020 Pennsylvania Climate Change Impacts Assessment Update, April 2020, http://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/ClimateChange/2020ClimateChangeImpactsAssessmentUpdate.pdf.

[27] Pennsylvania Department of Environmental Protection, 2018 Pennsylvania Climate Action Plan: Strategies and actions to reduce and adapt to climate change, April 29, 2019, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1454161&DocName=2018%20PA%20CLIMATE%20ACTION%20PLAN.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e

[28] Pennsylvania Department of Environmental Protection, 2020 Pennsylvania Greenhouse Gas Inventory Report, July 2020, https://files.dep.state.pa.us/Energy/Office%20of%20Energy%20and%20Technology/OETDPortalFiles/Climate%20Change%20Advisory%20Committee/2020/Pennsylvania%202020%20GHG%20Inventory%20Report.pdf

The Commonwealth's GHG Emission Reduction Goals

It is for these reasons that on January 8, 2019, Governor Tom Wolf signed Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*, codified at 4 Pa. Code §§ 5.1001—5.1009.[29] This Executive Order set the first ever climate change goal for this Commonwealth to reduce net GHG emissions from 2005 levels by 26% by 2025 and 80% by 2050. These climate change goals align this Commonwealth with the reduction targets under the Paris Agreement aimed at keeping global temperature rise below the 2-degree Celsius threshold. According to climate experts, the 2-degree Celsius threshold is the level beyond which dire global consequences would occur, including sea level rise, superstorms and crippling heat waves.

On April 29, 2019, the Department issued a Pennsylvania Climate Action Plan that identified GHG emission trends and baselines in this Commonwealth and recommended cost-effective strategies for reducing or offsetting GHG emissions. The Department's Climate Action Plans are available at https://www.dep.pa.gov/Citizens/climate/Pages/CCAC.aspx. The Climate Action Plan determined that reducing the overall carbon intensity of the electricity generated in this Commonwealth is one of the most critical strategies for reducing GHG emissions. The Climate Action Plan also identified many different strategies and actions that all Pennsylvanians can take to combat climate change. According to the Climate Action Plan, one of the most cost-effective emissions reduction strategies is to limit CO_2 emissions through an electricity sector cap and trade program. This Commonwealth participating in a cap and trade program is expected to result in the largest near-term reduction in emissions and was deemed cost-effective relative to the social cost of carbon. The Climate Action Plan modeled a cap and trade program that requires a carbon cap equal to a 30% reduction from 2020 CO_2 emissions levels by 2030, which is equivalent to RGGI stringency.

On October 3, 2019, Governor Tom Wolf signed Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, codified at 4 Pa. Code §§ 7a.181—7a.183,[30] which directed the Department to use its existing authority under the APCA to develop a rulemaking to abate, control or limit CO_2 emissions from fossil fuel-fired electric power generators. The Executive Order also directed the Department to present a proposed rulemaking to the Board by July 31, 2020. On June 22, 2020, Governor Wolf amended the Executive Order to extend the deadline to September 15, 2020. As directed by the Executive Order, this final-form rulemaking establishes a CO_2 budget consistent in stringency to that established by the participating states, provides for the annual or more frequent auction of CO_2 emissions allowances through a market-based mechanism, and is sufficiently consistent with the RGGI Model Rule such that allowances may be traded with holders of allowances from other states.

Considering that this Commonwealth has the fifth leading CO_2 emitting electricity generation sector[31] in the country, this final-form rulemaking is a significant component in achieving the Commonwealth's goals to reduce GHG emissions. Although this final-form rulemaking will not solve global climate change, it will aid this Commonwealth in addressing its share of the impact, joining other states and countries that are addressing their own impacts. The statutory authority for this final-form rulemaking, the APCA, is

[29] Executive Order 2019-01, *Commonwealth Leadership in Addressing Climate Change and Promoting Energy Conservation and Sustainable Governance*, January 8, 2019, https://www.governor.pa.gov/newsroom/executive-order-2019-01-commonwealth-leadership-in-addressing-climate-change-and-promoting-energy-conservation-and-sustainable-governance/.
[30] Executive Order 2019-07, *Commonwealth Leadership in Addressing Climate Change through Electric Sector Emissions Reductions*, October 3, 2019, https://www.oa.pa.gov/Policies/eo/Documents/2019-07.pdf.
[31] EIA, Energy-Related CO_2 Emission Data Tables, March 2, 2021, https://www.eia.gov/environment/emissions/state/

built on a precautionary principle to protect the air resources of this Commonwealth for the protection of public health and welfare and the environment, including plant and animal life and recreational resources, as well as development, attraction and expansion of industry, commerce and agriculture. In order to be proactive, this final-form rulemaking is needed to address this Commonwealth's contributions to climate change, particularly CO_2 emissions. The Board determined to address CO_2 emissions through a regional initiative because regional cap and trade programs have proven to be beneficial and cost-effective at reducing air pollutant emissions. In fact, this Commonwealth has and continues to participate in successful regional cap and trade programs.

History and Success of this Commonwealth's Participation in Cap and Trade Programs

In the 1990 CAA Amendments, the United States Congress determined that the use of market-based principles, such as emissions banking and trading are effective ways of achieving emission reductions.[32] According to the EPA, emissions trading programs are best implemented when the environment and public health concerns occur over a relatively large geographic area and effectively designed emissions trading programs provide flexibility for individual emissions sources to tailor their compliance path to their needs.[33] The EPA has also determined that reducing emissions using a market-based system provides regulated sources with the flexibility to select the most cost-effective approach to reduce emissions and has proven to be a highly effective way to achieve emission reductions, meet environmental goals, and improve human health.[34] In contrast to traditional command and control regulatory methods that establish specific emissions limitations and technology use with limited or no flexibility, cap and trade programs harness the economic incentives of the market to reduce pollution. The Board has a decades-long history of promulgating regulations that have established this Commonwealth's participation in successful cap and trade programs.

Beginning in 1995, this Commonwealth participated in the first national cap and trade program in the United States, the Acid Rain Program, which was established under Title IV of the 1990 CAA Amendments and required, in part, major emission reductions of SO_2 through a permanent cap on the total amount emitted by EGUs.[35] For the first time, the Acid Rain Program introduced a system of allowance trading that used market-based incentives to reduce pollution. The Acid Rain Program reduced SO_2 emissions by 14.5 million tons (92%) from 1990 levels and 16.0 million tons (93%) from 1980 levels.[36] The undisputed success of achieving significant emission reductions in a cost-effective manner led to the application of the market-based cap and trade tool for other regional environmental problems.

From 1999 to 2002, this Commonwealth participated in the Ozone Transport Commission's (OTC) NO_x Budget Program, an allowance trading program designed to reduce summertime NO_x emissions from EGUs to reduce ground-level ozone, which included all the current states participating in RGGI.[37] According to the OTC's NO_x Budget Program 1999-2002 Progress Report,[38] NO_x Budget Program units

[32] See 42 U.S.C.A. §§ 7651-7651o.
[33] See generally, 63 FR 57356 (October 27, 1998).
[34] See 63 FR 57356, 57458.
[35] See 24 Pa.B. 5899 (November 26, 1994) and 25 Pa. Code § 127.531 (relating to special conditions related to acid rain).
[36] EPA, 2018 Power Sector Programs Progress Report, 2018, https://www3.epa.gov/airmarkets/progress/reports/pdfs/2018_full_report.pdf.
[37] See 27 Pa.B. 5683 (November 1, 1997) and 25 Pa. Code §§ 123.101—123.121 (relating to NO_x Allowance Requirements).
[38] OTC, NO_x Budget Program 1999-2002 Progress Report, https://nepis.epa.gov/Exe/ZyNET.exe/P1002LY4.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

successfully reduced ozone season NO_x emissions in 2002 by nearly 280,000 tons, or about 60%, from 1990 baseline levels, achieving greater reductions than required each year of the program.[39] Based on the success of the OTC's NO_x Budget Program and the Acid Rain Program, in 2003 the EPA implemented a regional NO_x cap and trade program under the NO_x SIP Call, which closely resembled the OTC NO_x Budget Program.[40] The EPA again noted the cost savings of achieving emissions reductions through trading. The EPA's regional NO_x cap and trade program was adopted by the Board on September 23, 2000 to reduce NO_x emissions Statewide.[41]

Beginning in 2009, the EPA's NO_x Budget Trading Program was replaced by the Clean Air Interstate Rule (CAIR) trading program, covering 28 eastern states, which required further summertime NO_x reductions from the power sector as well as SO_2 reductions. Finally, in 2015 CAIR was replaced by the Cross-State Air Pollution Rule trading program.

Specifically, the Board promulgated the NO_x Budget Trading Program in Chapter 145, Subchapter A (relating to NO_x Budget Trading Program) and the CAIR NO_x and SO_2 Trading Programs in Chapter 145, Subchapter D (relating to CAIR NO_x and SO_2 Trading Programs).[42] Although those cap and trade program regulations were promulgated in response to initiatives at the Federal level, both subchapters were promulgated under the broad authority of section 5(a)(1) of the APCA, as is this final-form rulemaking. The statutory authority granted to the Board under section 5(a)(1) of the APCA is broad and unrestrictive related to the adoption of any rule or regulation for the "prevention, control, reduction and abatement of air pollution." The comprehensive scope of this directive provides the Board with the discretion to promulgate a trading program to reduce CO_2 emissions from fossil fuel-fired EGUs in this Commonwealth.

Regional Greenhouse Gas Initiative (RGGI)

RGGI is a cooperative regional market-based cap-and-trade program designed to reduce CO_2 emissions from fossil fuel-fired EGUs. RGGI is currently composed of eleven northeastern and Mid-Atlantic states, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont and Virginia. Since its inception on January 1, 2009, RGGI has utilized a market-based mechanism to cap and cost-effectively reduce CO_2 emissions that cause climate change. Because CO_2 from large fossil fuel-fired EGUs is a major contributor to regional climate change, the participating states developed a regional approach to address CO_2 emissions. This regional approach resulted in a Model Rule applicable to fossil fuel-fired EGUs with a nameplate capacity equal to or greater than 25 MWe.

RGGI is implemented in the participating states through each state's independent CO_2 Budget Trading Program regulations, based on the Model Rule, which link together. It is also important to note that States do not execute a multistate agreement or compact to participate in RGGI, and States may withdraw from

%5C00000017%5CP1002LY4.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL

[39] The Progress Report is available on the EPA's webpage for the National Service Center for Environmental Publications, https://nepis.epa.gov

[40] 63 FR 57356.

[41] See 30 Pa.B. 4899 (September 23, 2000) and 25 Pa. Code Chapter 145, Subchapter A (relating to NO_x Budget Trading Program).

[42] See 30 Pa.B. 4899 and 38 Pa.B. 1705. See also 25 Pa. Code Chapter 145, Subchapter A (relating to NO_x Budget Trading Program) and 25 Pa. Code Chapter 145, Subchapter D (relating to CAIR NO_x and SO_2 Trading Programs).

participation at any time. There is also no central RGGI authority as States jointly oversee the program. The key piece to become a "participating state," as the term is defined under § 145.302 (relating to definitions), is the establishment of a corresponding regulation as part of the CO_2 Budget Trading Program. As defined under § 145.302, the "CO_2 Budget Trading Program" is a multi-state CO_2 air pollution control and emissions reduction program established under this final-form rulemaking and corresponding regulations in other participating states as a means of reducing emissions of CO_2 from CO_2 budget sources. For this Commonwealth to participate in RGGI, the Board is promulgating this final-form rulemaking which is consistent with the Model Rule.

RGGI is a "cap and trade" program that sets a regulatory limit on CO_2 emissions from fossil fuel-fired EGUs and permits trading of CO_2 allowances to effect cost efficient compliance with the regulatory limit. RGGI is also referred to as a "cap and invest" program, because unlike traditional cap and trade programs, RGGI provides a "two-prong" approach to reducing CO_2 emissions from fossil fuel-fired EGUs. The first prong involves a declining CO_2 emissions budget and the second prong is investment of the proceeds resulting from the auction of CO_2 allowances to further reduce CO_2 emissions.

Benefits of RGGI Participation

Cap and trade programs have an established track record as economically efficient, market-driven mechanisms for reducing pollution in a variety of contexts. Other countries and states have found that cap and trade programs are effective methods to achieve significant GHG emission reductions. RGGI is one of the most successful cap and trade programs and it is well-established with an active carbon trading market for the northeastern United States. This successful market-based program has significantly reduced and continues to reduce emissions. The participating states have collectively reduced power sector CO_2 pollution by over 45% since 2009, while experiencing per capita Gross Domestic Product growth and reduced energy costs.[43] The program design of RGGI would enable the Board to regulate CO_2 emissions from the power sector in a way that is least-cost and economically efficient thereby driving long-term investments in cleaner sources of energy.

Part of what makes RGGI economically efficient is that it is a regional program, which allows EGUs to achieve least-cost compliance by buying and selling allowances in multistate auctions or in the secondary market. RGGI CO_2 allowances are fungible across the participating states, meaning that though this Commonwealth has an established allowance budget for each year, this Commonwealth's allowances are available to meet the compliance obligations in any other RGGI state and vice versa at the option of the regulated sources. Therefore, CO_2 emissions from this Commonwealth's power sector are not limited to strictly the amount of this Commonwealth's CO_2 allowances. This cooperation allows EGUs more flexibility in terms of compliance and allows the market to continue to signal entrance and exit of generation. Though each state has its own annual allocation, compliance occurs at the regional level rather than on a state-by-state basis. In this respect the market assists in achieving least cost compliance for all participating states.

Another benefit of participating in multistate auctions run by RGGI, Inc. is that RGGI, Inc. has retained the services of an independent market monitor to monitor the auction, CO_2 allowance holdings, and CO_2 allowance transactions, among other activities. The market monitor provides independent expert monitoring of the competitive performance and efficiency of the RGGI allowance market. This includes identifying attempts to exercise market power, collude, or otherwise manipulate prices in the auction

[43] Analysis Group, 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, https://www.analysisgroup.com/globalassets/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_april_2018.pdf

and/or the secondary market, making recommendations regarding proposed market rule changes to improve the efficiency of the market for RGGI Allowances, and assessing whether the auctions are administered in accordance with the noticed auction rules and procedures. The market monitor will monitor bidder behavior in each auction and report to the participating states any activities that may have a material impact on the efficiency and performance of the auction. The participating states, through RGGI, Inc., release a Market Monitor Report shortly after each CO_2 allowance auction. The report includes aggregate information about the auction including the dispersion of projected demand, the dispersion of bids, and a summary of bid prices, showing the minimum, maximum, average and clearing price and the allowances awarded.

RGGI has helped the participating states create jobs, save money for consumers, and improve public health, while reducing power sector emissions and transitioning to a cleaner electric grid. In an independent and nonpartisan evaluation of the first three control periods in RGGI, the Analysis group, one of the largest economic consulting firms globally, found that the participating states experienced economic benefits in all three control periods, while reducing CO_2 emissions. The participating states added between $1.3 billion and $1.6 billion in net economic value during each of the three control periods. The participating states also showed growth in economic output, increased jobs and reduced long-run wholesale electricity costs.[44]

A recent report from the Acadia Center, a nonprofit organization committed to advancing the clean energy future, entitled "The Regional Greenhouse Gas Initiative: Ten Years in Review," shows that CO_2 emissions from covered sources in the participating states have decreased 47%, which is 90% faster than in the rest of country. The participating states were able to achieve that significant reduction while the gross domestic product grew by 47%, outpacing the rest of the country by 31%. RGGI has also driven substantial reductions in harmful co-pollutants, making the region's air cleaner and its people healthier. Additionally, proceeds from RGGI auctions generated nearly $3.3 billion in state investments from 2009 to 2019.[45]

For comparison, according to the Department's 2020 GHG Inventory Report from 2005 to 2016, this Commonwealth reduced its net emissions by 33.5% while the participating states reduced covered sources CO_2 pollution over 45% over the same period. Additionally, this was achieved while the region's per-capita GDP has continued to grow- highlighting the synergies between environmental protection and economic development.

Emissions Reductions

The design of the CO_2 Budget Trading Program within this final-form rulemaking ensures emissions from the electricity generation sector are decreased over time. Between 2022 and 2030, the program's CO_2 emissions budget will decrease 19,914,960 tons, equal to a reduction of 25.532%, as shown in Table 1. However, to capture the full extent of the benefits of this final-form rulemaking it is critical to compare this Commonwealth's annual emissions with this final-form rulemaking and without it from 2022 to 2030.

[44] *Id.*

[45] Acadia Center, "The Regional Greenhouse Gas Initiative 10 Years in Review," 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

Table 1. Pennsylvania CO_2 Emissions Budget Through 2030.

Year	Budget	Decline (Tonnage)	Annual Decline (Percentage)
2022	78,000,000	2,489,370	-3.19%
2023	75,510,630	2,489,370	-3.30%
2024	73,021,260	2,489,370	-3.41%
2025	70,531,890	2,489,370	-3.53%
2026	68,042,520	2,489,370	-3.66%
2027	65,553,150	2,489,370	-3.80%
2028	63,063,780	2,489,370	-3.95%
2029	60,574,410	2,489,370	-3.11%
2030	58,085,040	2,489,370	-4.11%
2022-2030 Total Reduction		**19,914,960**	**-25.532%**
-25.532% reduction from 2022		**58,085,040**	
Total tonnage reduction		**19,914,960**	
Annual tonnage reduction		**2,489,370**	

In order to analyze the full extent of CO_2 emission reductions due to this final-form rulemaking, the Department utilized the Integrated Planning Model (IPM) to compare this Commonwealth's CO_2 emissions, among other attributes, with implementation of this final-form rulemaking and without implementation of this final-form rulemaking. IPM is a dynamic model of the United States power sector that can determine least-cost solutions of meeting energy and peak demand requirements. The model considers a number of key operating or regulatory constraints, such as emission limits, transmission capabilities and constraints, renewable generation requirements, fuel market constraints, etc. IPM can perform integrated analysis and can project wholesale power prices, CO_2 allowance prices, and CO_2 emissions in an optimal and internally consistent manner. It is also particularly suited to evaluating the impacts of environmental regulations and policies.

IPM is well-suited to consider complex treatment of emission regulations involving trading, banking and traditional command-and-control emission policies. Because of the model's endogenous treatment of natural gas, coal and biomass fuel markets, it is fully capable of analyzing policies that directly affect these markets. A detailed unit-level database of every grid-connected EGU in the United States is the fundamental input to IPM. The model represents power markets through model regions that are geographical entities with distinct characteristics. Wholesale power prices, fuel prices, emission allowance prices, and renewable energy credits are all estimated endogenously in an integrated fashion.

The IPM analysis produced two results for this final-form rulemaking. The first is a "Reference Case" based on this final-form rulemaking not being implemented in this Commonwealth or business as usual. The second is a "Policy Case" based on this final-form rulemaking being implemented in this Commonwealth and the auction proceeds being invested in efforts to further reduce air pollution. Comparing these two cases, the Department estimates that this Commonwealth will experience CO_2 emission reductions of 97—227 million short tons from sources within this Commonwealth over the decade as a direct result of participation in RGGI. This results in CO_2 reductions in this Commonwealth and a net benefit to the entire PJM region. The Department's modeling shows that this Commonwealth makes these significant emission reductions while maintaining historic electric generation levels, enhancing this Commonwealth's status as a leading net energy exporter, creating economic

opportunities and reducing long-term wholesale energy prices. This modeling effort will be referred to as the "2020 modeling."

In 2021, the Department used the IPM model to conduct an updated analysis with updated inputs. The updated inputs included the most recent projections for natural gas prices, regional electricity demand, expected power plant closures and openings, policy changes in this Commonwealth and other states, technology costs, and other minor updates that changed since the Department conducted a modeling analysis in 2020. This modeling effort will be referred to as the "2021 modeling."

Similar to the 2020 modeling, the Department used the IPM model to produce two results, a "Reference Case" and a "Policy Case," to evaluate the various metrics in this Commonwealth with this final-form rulemaking in effect compared to this final-form rulemaking not in effect between 2021-2030.

The 2021 modeling confirmed many of the trends and findings identified in the 2020 modeling. Specifically, the 2021 modeling projected a range of 97-227 million short tons of CO_2 will not be emitted by sources within this Commonwealth over the decade as a result of this final-form rulemaking. The 2021 modeling does not include all the results that the 2020 modeling did, including projected co-pollutant emissions, health benefits, and broader economic metrics. Additionally, the 2021 modeling does not factor in how program proceeds are invested, while the 2020 modeling assumed strategic investments were made back into the energy sector. Nonetheless, both the 2020 modeling and the 2021 modeling efforts are useful indicators to evaluate implementation of this final-form rulemaking and both will be referenced throughout this document. All modeling results are available publicly at https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx.

Health Benefits of this Final-form Rulemaking

This final-form rulemaking would provide public health benefits due to the expected reductions in emissions of CO_2 and the ancillary emission reductions or co-benefits of SO_2 and NO_x reductions. The Department's 2020 modeling projects cumulative emission reductions of 112,000 tons of NO_x and around 67,000 tons of SO_2 over the decade. Further reducing NO_x and SO_2 emissions is beneficial to public health, because NO_x and SO_2 contribute to several health problems.

Short-term exposure to SO_2 emissions can be harmful to public health because it impacts the ability to breathe especially in children and those with asthma.[46] NO_x can also cause irritation in the respiratory system. In particular, long-term exposure to elevated NO_x levels may contribute to asthma, and potentially increase susceptibility to respiratory infections and lead to increased hospital admissions.[47]

NO_x and SO_2 emissions are also major contributors to PM pollution, which is a mixture of microscopic solid and liquid droplets that are suspended in the air. The smaller the size of the particle, the more damaging it is to human health. $PM_{2.5}$, which is particulate matter that is particularly damaging as the particles are small enough to get deep into the lungs, and perhaps even enter the bloodstream. Children are at increased risk of health impacts from PM as their lungs are still developing, and PM can exacerbate asthma or acute respiratory disease. Elevated levels of PM will also aggravate adults with COPD, asthma, coronary artery disease, or congestive heart failure. When particle levels in the air are high, older adults are more likely to be hospitalized, and death from aggravated heart or lung disease may occur.[48]

[46] EPA, Sulfur Dioxide (SO_2) Pollution, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#what%20is%20so2
[47] EPA, Particulate Pollution and Your Health, September 2003, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1001EX6.txt.
[48] *Id.*

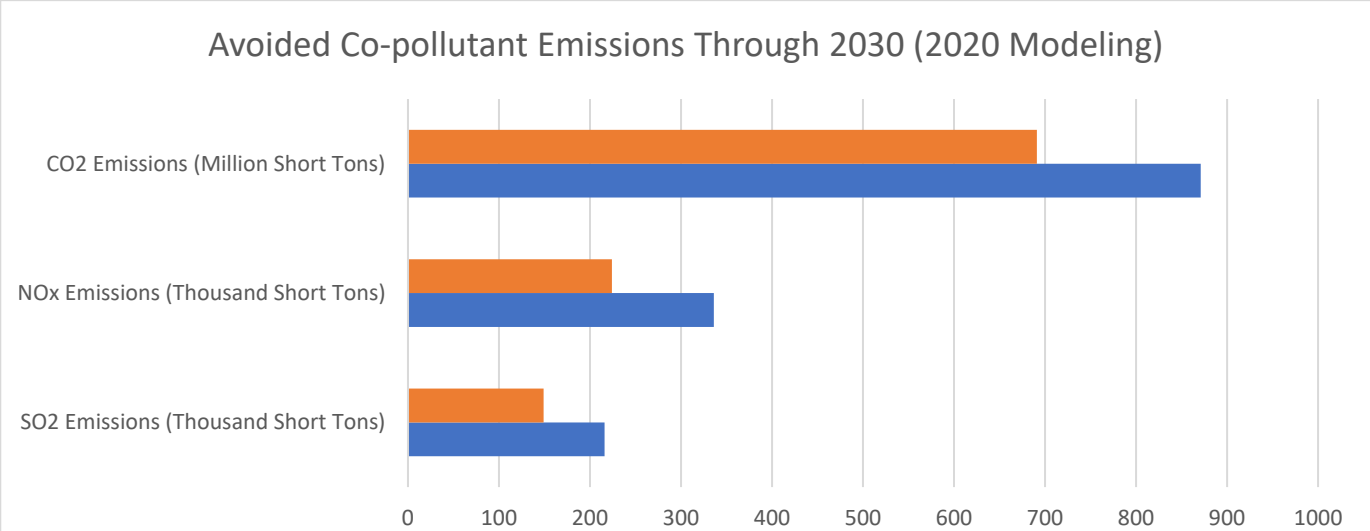
NO_x emissions also contribute to the formation of ground-level ozone. When ozone occurs at ground level it presents a serious air quality problem in many parts of the United States, including this Commonwealth. Ground level ozone is formed when pollutants emitted from a variety of sources, including power plants, react with sunlight. Ozone negatively affects human health as it irritates the respiratory system, reduces lung function, aggravates asthma, and inflames and damages the lining of the lungs.[49] Those especially at risk from ground-level ozone exposure are children, adults who are active outdoors, and those with underlying respiratory issues such as asthma.

A 2017 independent study by Abt Associates, a global research firm focused on health and environmental policy, on the "Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014" showed that participating states gained significant health benefits in the first six years of RGGI implementation alone. From 2009-2014, the participating states avoided around 24% of CO_2 emissions that would have otherwise been emitted during that period, resulting in around $5 billion in avoided health related costs.[50] Since this final-form rulemaking would lead to a 31% reduction of projected CO_2 emissions, or avoided emissions, over the next decade, this Commonwealth is likely to see similar gains in health benefits.

A recent study led by researchers from the Columbia Center for Children's Environmental Health at Columbia University Mailman School of Public Health ("Columbia study"), published on July 29, 2020, on the "Co-Benefits to Children's Health of the U.S. Regional Greenhouse Gas Initiative" indicates that the health benefits from RGGI are even more significant than estimated in 2017 by Abt Associates. The Columbia study concluded that the co-pollutant reductions resulting from RGGI have provided considerable child health benefits to participating and neighboring states. In particular, between 2009-2014, RGGI resulted in an estimated 537 avoided cases of childhood asthma, 112 avoided preterm births, 98 avoided cases of autism spectrum disorder, and 56 avoided cases of term low birthweight. Those child health benefits also have significant economic value, estimated at $199.6–358.2 million between 2009 and 2014 alone. However, the researchers note that the actual health benefits are even greater than estimated because the analysis does not capture the future health benefits related to reductions in childhood PM2.5 exposure and mitigating climate change, such as fewer heat-related illnesses or cases of vector-borne disease to which children are especially vulnerable.[51]

[49] EPA, Health Effects of Ground-Level Ozone, http://web.archive.org/web/20160220023128/http://www3.epa.gov/airquality/ozonepollution/health.html.
[50] Abt Associates, "Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014," January 2017, https://www.abtassociates.com/sites/default/files/files/Projects/executive%20summary%20RGGI.pdf.
[51] Frederica Perera, David Cooley, Alique Berberian, David Mills, and Patrick Kinney, "Co-Benefits to Children's Health of the U.S. Regional Greenhouse Gas Initiative," Environmental Health Perspectives, Vol. 128, No. 7, July 2020, https://ehp.niehs.nih.gov/doi/10.1289/EHP6706.

Figure 1. CO_2, NO_x and SO_2 Emission Reductions Comparison (2020 Modeling).



	SO2 Emissions (Thousand Short Tons)	NOx Emissions (Thousand Short Tons)	CO2 Emissions (Million Short Tons)
Policy Case	149	224	691
Reference Case	216	336	871

Benefit-per-Ton (BPT) Methodology

To calculate the public health benefits of avoided emissions, the Department used the EPA's Regional Benefit-per-Ton (BPT) methodology.[52] This approach applies an average benefit per ton derived from modeling of benefits of specific air quality scenarios. The EPA's benefit-per-ton approach "relies on estimates of human health responses to exposure to PM and ozone obtained from the peer-reviewed scientific literature."[53] These estimates are then used in conjunction with emissions reductions or avoided emissions to conduct health impact and economic benefit assessments.

Specifically, to calculate benefits of avoided emissions, the Department multiplied the benefit-per-ton estimates (using the 3% discount rate) by the corresponding emission reductions that were generated from the power sector modeling for this final-form rulemaking. This methodology relies on two U sets of co-efficient for calculations, from two cohort studies. The Krewski calculation serves as the lower bound and the Lepeule calculation as the upper bound of projected impacts. As this final-form rulemaking spans the timeframe of 2022 to 2030, so does the analysis of the health benefits due to avoided emissions. However, the emission reductions from this final-form rulemaking will provide benefits that extend well beyond 2030. Based on these calculations, the public health benefits to this Commonwealth of avoided SO_2 and NO_x emissions range between $2.79 billion to $6.3 billion by 2030, averaging between $232 million to $525 million per year.

Table 2. Public Health Benefits of Emissions Reductions.

Avoided Emissions	**Krewski (low-end)**	**Lepeule (high-end)**
Benefits of Avoided SO_2 Emissions	$2,415,130,517	$5,458,234,159
Benefits of Avoided NOx Emissions	$372,171,575	$840,749,945
TOTAL	$2,787,302,092	$6,298,984,104

Incidence-per-Ton (BPT) Methodology

The Department used the EPA's Regional Incidence-per-Ton (IPT) methodology which calculates total avoided incidences of major health issues and avoided lost work and school days due to reduced emissions. Again, to calculate reduced incidences of avoided emissions, we multiplied the incidence-per-ton estimates (using the 3% discount rate) by the corresponding 2020 modeling emission reductions that were generated from the power sector modeling for this final-form rulemaking. Again, using the Krewski and Lepeule incidence co-efficients as the lower and upper bound respectively.[54]

Based on an assumption that 188 million tons of CO_2 emissions are avoided through 2030, the Department estimated that between 283 and 641 premature deaths will be avoided in this Commonwealth due to emission reductions resulting directly from this final-form rulemaking.

Table 3. Avoided Premature Deaths by 2030 from emissions reductions from this regulation.

	Avoided Deaths by 2030
Krewski	282
Lepeule	639

Children and adults alike will suffer less from respiratory illnesses. The methodology projects 31,000 fewer incidences of upper and lower respiratory symptoms which will lead to reduced emergency department visits and avoided hospital admissions. Healthier children will be able to play more, as incidences of minor restricted-activity days decline on the order of almost 500,000 days between now and 2030. Adults would be healthier as well. The methodology projects over 83,000 avoided lost workdays due to health impacts.

Table 4. Avoided Health Impacts by 2030 from emission reductions from this regulation.[55]

Incidences per Ton (IPT)	**Avoided Incidences Through 2030**
Emergency department visits for asthma	335
Acute bronchitis (age 8–12)	1,011
Lower respiratory symptoms	12,898
Upper respiratory symptoms	18,458
Minor restricted-activity days	495,487
Lost workdays (age 18–65)	83,639
Asthma exacerbation (age 6–18)	45,299
Hospital Admissions, Respiratory	211
Hospital Admissions, Cardiovascular	258

[52] EPA, Regulatory Impact Analysis for the Clean Power Plan Final Rule, October 2015, https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf.
[53] *Id.*
[54] EPA, Co-efficients for the Eastern Region for both the IPT and BPT Methodologies can be found in the Regulatory Impact Analysis for the Clean Power Plan Final Rule, October 2015, https://www3.epa.gov/ttnecas1/docs/ria/utilities_ria_final-clean-power-plan-existing-units_2015-08.pdf.
[55] *Id.*

Investment of Auction Proceeds Benefits Consumers and the Economy

The proceeds generated from this final-form rulemaking would be invested into programs that would reduce air pollution and create positive economic impacts in this Commonwealth. The Department plans to develop a draft plan for public comment outlining reinvestment options separate from this final-form rulemaking. However, the Department conducted modeling to estimate the economic impacts of this final-form rulemaking. The Department analyzed the net economic benefits of the program investments using the Regional Economic Model, Inc. model (REMI). The extensive economic modeling will help the Department determine the best ways to invest the auction proceeds in this Commonwealth to maximize emission reductions and economic benefits. The modeling anticipates that in the first year of participation in RGGI, hundreds of millions of dollars in auction proceeds will be generated for the use in the elimination of air pollution in this Commonwealth. The auction proceeds would be spent on programs related to the regulatory goal, and the Department modeled a scenario in which the proceeds are invested in energy efficiency, renewable energy and GHG abatement.

The proceeds will aid this Commonwealth in the transition toward a clean energy economy. In 2015, the EPA noted that the energy market was moving toward cleaner sources of energy and states needed to make plans for and invest in the next generation of power production, particularly considering that current assets and infrastructure were aging. By strategically investing the proceeds, this Commonwealth can help ensure that, as new investments are being made, they are integrated with the need to address GHG pollution from the electric generation sector. See 80 FR 64661, 64678 (October 23, 2015). These energy transitions are occurring both in this Commonwealth and Nationally.

Nationally, the last ten years have seen coal's position steadily erode due to a combination of low electricity demand, mounting concern over climate, and increased competition from natural gas and renewables. The same is true for coal generation in this Commonwealth. Since 2005, electricity generation in this Commonwealth has shifted from higher carbon-emitting electricity generation sources, such as coal, to lower and zero emissions generation sources, such as natural gas, and renewable energy. Between now and 2030, coal generation is expected to decline dramatically. In 2010, coal generation represented 47% of this Commonwealth's generation portfolio and is expected to decline to roughly 1% of this Commonwealth's generation portfolio in 2030.[56] This shift away from coal-fired generation occurs irrespective of this Commonwealth's participation in RGGI. Anticipating the need for transition, for these communities and employees, auction proceeds can be used to mitigate these impacts and assist communities and families through the energy transition. This could include repowering of the existing coal-fired power plants to natural gas, investments in worker training or other community-based support programs.

The Department would invest a portion of the proceeds in energy efficiency initiatives because energy efficiency is a low-cost resource for achieving CO_2 emission reductions while reducing peak demand and ultimately reducing electricity costs. Lower energy costs create numerous benefits across the economy, allowing families to invest in other priorities and businesses to expand. Energy efficiency savings can be achieved cost-effectively by upgrading appliances and lighting, weatherizing and insulating buildings, upgrading HVAC and improving industrial processes. Additionally, all consumers benefit from energy efficiency programs, not just direct program participants because focused investment in energy efficiency can lower peak electricity demand and can decrease overall electricity costs which results in savings for all energy consumers. Additionally, energy efficiency projects are labor-intensive which create local jobs and

[56] EIA, State Electricity Profiles 2010, January 2012, www.eia.gov/electricity/state/archive/sep2010.pdf.

boost local economy. For instance, projects involving home retrofits directly spur employment gains in the housing and construction industries.

Investing a portion of the auction proceeds into energy efficiency initiatives is also crucial to addressing the impacts of climate change on consumers. According to the NCA4, rising temperatures are projected to reduce the efficiency of power generation while increasing energy demands, resulting in higher electricity costs. Energy efficiency will help lessen those impacts by putting downward pressure on both demand and electricity costs.

Historically, the participating states have invested a significant portion of their auction proceeds in energy efficiency programs. According to RGGI's 2018 Investment Report,[57] over the lifetime of the installed measures, the investments made in energy efficiency in 2018 alone are projected to save participants over $1.2 billion on energy bills, providing benefits to more than 115,000 participating households and 1,200 participating businesses. The investments are also projected to further avoid the release of 1.4 million short tons of CO_2 pollution.

The Department would also invest a portion of the proceeds in clean and renewable electricity generation, such as energy derived from clean or zero emissions sources including geothermal, hydropower, solar and wind. Clean and renewable energy systems reduce reliance on fossil fuels and provide climate resilience benefits, including reduced reliance on centralized power. They also offer the opportunity to save money on electricity costs by installing on-site renewable energy and also reduce power lost through transmission and distribution. Investing in clean and renewable projects will help this Commonwealth meet its climate goals, drive in-state investments and job creation, and lessen the pressure on the CO_2 allowance budget by generating more electricity without additional emissions.

The participating states invested 19% of their 2018 auction proceeds in clean and renewable energy projects. Over the lifetime of the projects installed in 2018, these investments are projected to offset about $600 million in energy expenses for households and businesses. The investments are also projected to avoid the release of 1.9 million short tons of CO_2 emissions.[58]

The Department would also invest a portion of the proceeds in GHG abatement initiatives. GHG abatement includes a broad category of projects encompassing other ways of reducing GHGs, apart from energy efficiency and clean and renewable energy. Examples of potential programs in this Commonwealth include abandoned oil and gas well plugging, electric vehicle infrastructure, carbon capture, utilization and storage, combined heat and power, energy storage, repowering projects and vocational trainings, among others.

For reference, in 2018, an estimated 20% of RGGI investments were made in GHG abatement programs and projects. For the duration of the project lifetime, those investments are expected to avoid over 1.2 million short tons of CO_2 emissions across the region.[59]

In the 2020 modeling, the Department modeled an investment scenario with 31% of annual proceeds for energy efficiency, 32% for renewable energy and 31% for GHG abatement, and 6% for any programmatic costs related to the oversight of the CO_2 Budget Trading Program (5% for the Department and 1% for

[57] RGGI, Inc., The Investment of RGGI Proceeds in 2018, July 2020, https://www.rggi.org/sites/default/files/Uploads/Proceeds/RGGI_Proceeds_Report_2018.pdf.
[58] *Id.*
[59] *Id.*

RGGI, Inc). These programmatic costs are in line with the historical amounts reserved by the participating states.

The results of the 2020 modeling show that this final-form rulemaking will not only combat climate change and improve air quality for residents, but also be of positive economic value to this Commonwealth. The modeling estimates that from 2022 to 2030, this final-form rulemaking would lead to an increase in Gross State Product (GSP) of $1.9 billion and a net increase of over 30,000 jobs in this Commonwealth. The Department's 2020 modeling also indicates that investments from this final-form rulemaking would spur an addition of 9.4 gigawatts (GW) of renewable energy and result in a load reduction of 29 terawatt hours of electricity from energy efficiency projects.

(11) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

There is not a corresponding federal regulation that reduces CO_2 emissions from fossil fuel-fired EGUs through a CO_2 budget trading program. Therefore, this final-form rulemaking will be more stringent than federal requirements.

In 2009, under CAA section 202(a)(1), (42 U.S.C.A. § 7521(a)(1)), the EPA issued an "Endangerment Finding," that six GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride—endanger both the public health and the public welfare of current and future generations by causing or contributing to climate change. See 74 FR 66496 (December 15, 2009). The EPA's 2009 endangerment finding particularly concerned GHG emissions released from motor vehicles. However, in 2015, the EPA issued an endangerment finding for GHG emissions released from new EGUs through the promulgation of its regulation concerning "Standards of Performance for Greenhouse Gas Emissions From New, Modified, and Reconstructed Stationary Sources: Electric Utility Generating Units." See 80 FR 64509 (October 23, 2015).

On January 19, 2021, the D.C. Circuit Court of Appeals affirmed that the endangerment finding issued for new EGUs provided a sufficient basis for the EPA's regulation controlling GHG emissions from existing EGUs, commonly known as the "Affordable Clean Energy Rule or ACE rule" in its decision vacating the rule and remanding it back to the EPA. See *Am. Lung Ass'n v. Env't Prot. Agency*, 985 F.3d 914 (D.C. Cir. 2021). In other words, the EPA made a source-specific finding that GHG emissions, principally CO_2, from EGUs endanger public health and welfare and cause or contribute to climate change. Additionally, the EPA's Endangerment Findings are further reinforced by the findings of the USGCRP's NCA4 which is consistent with the Commonwealth's 2015, 2020, and 2021 Climate Change Impacts Assessments. While these Federal studies inform the Department's decision to regulate CO_2 emissions within this Commonwealth, they are not determinative because this final-form rulemaking is being promulgated by the Board under the authority of the APCA, not the CAA.

The Board has the authority to promulgate this final-form rulemaking under the APCA. Specifically, section 5(a)(1) of the APCA provides the Board with broad authority to adopt rules and regulations for the prevention, control, reduction and abatement of air pollution in this Commonwealth. The purpose of the APCA is expansive because it seeks "to protect the air resources of the Commonwealth to the degree necessary for the … protection of public health, safety and well-being of its citizens …" See 35 P.S. § 4002(a). When the APCA was enacted, the General Assembly was concerned with air pollution generally and that it be remedied no matter what the source. *Id.* This is shown by the broad scope of the definitions of "air contamination," "air pollution" and "air contamination source" under section 3 of the APCA (35 P.S. § 4003). The broad language in the APCA shows an over-all legislative policy to provide

regulatory flexibility to the Board to address a pollutant like CO_2 proven to be inimical to public health and welfare and to be a key contributor to climate change. Therefore, this final-form rulemaking is consistent with the legislative intent and purpose under the APCA.

Through the APCA, the Legislature granted the Department and the Board the authority to protect the air resources of this Commonwealth, which is inclusive of controlling CO_2 pollution. CO_2 falls under the definition of "air pollution" in section 3 of the APCA. First, CO_2 is a gas, and falls within the definition of "air contaminant," under section 3 of the APCA, which is defined as "[s]moke, dust, fume, gas, odor, mist, radioactive substance, vapor, pollen or any combination thereof." By extension, CO_2 is also "air contamination," under section 3 of the APCA, which is defined as "[t]he presence in the outdoor atmosphere of an air contaminant which contributes to any condition of air pollution." The term "air pollution" is defined as "[t]he presence in the outdoor atmosphere of any form of contaminant … 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." Therefore, CO_2 is also considered to be "air pollution" under the APCA. Additionally, there is a significant body of scientific literature to show that CO_2 meets the definition of air pollution under the APCA. As mentioned previously, numerous sources, including the EPA, the Penn State University, the USGCRP and the IPCC, have confirmed that CO_2 emissions cause harmful air pollution that is inimical to the public health, safety and welfare, as well as human, plant and animal life. CO_2 is also a GHG and the largest contributor to climate change.

Section 5(a)(1) of the APCA also provides the Board with authority to regulate CO_2 emitted from fossil fuel-fired EGUs in this Commonwealth. Since the EGUs regulated under this final-form rulemaking emit CO_2, they fall within the definition of "air contamination source" under section 3 of the APCA, which is "[a]ny place, facility or equipment, stationary or mobile, at, from or by reason of which there is emitted into the outdoor atmosphere any air contaminant." As noted previously, the EPA has issued an Endangerment Finding for CO_2 emissions resulting from fossil fuel-fired EGUs. See 80 FR 64509 (October 23, 2015); *Am. Lung Ass'n v. Env't Prot. Agency*, 985 F.3d 914 (D.C. Cir. 2021). CO_2 is also a Federally regulated air pollutant under the CAA (42 U.S.C.A. §§ 7401—7671q). See *Massachusetts v. EPA*, 549 U.S. 497 (2007). Accordingly, regulating CO_2 emissions from fossil fuel-fired EGUs is necessary to protect public health and welfare from harmful air pollution and to address climate change.

In *Marcellus Shale Coalition v. Commonwealth*, 216 A.3d 448 (Cmwlth. Ct. 2019), the Commonwealth Court outlined the test for determining whether a legislative rulemaking has statutory authority. To determine whether a regulation is adopted within an agency's granted power, the Commonwealth Court stated that it looks to the statutory authority authorizing the agency to promulgate the legislative rule and examines that language to determine whether the rule falls within that grant of authority. The Court also found that the legislature's delegation must be clear and unmistakable. In particular, the Court considers the letter of the statutory delegation to create the rule and the purpose of the statute and its reasonable effect. *Id.*

As this final-form rulemaking would limit CO_2 pollution by regulating CO_2 emitted from fossil fuel-fired EGUs to ensure protection of public health, welfare and the environment, this final-form rulemaking is clearly within the Board's granted authority under the APCA and advances the purposes of the APCA to abate air pollution.

Furthermore, the auction proceeds amount to fees authorized under section 6.3(a) of the APCA and not an illegal tax. Section 6.3(a) of the APCA provides the Department with the authority to establish fees to support the air pollution control program. The Department is limited by its existing statutory authority

under Section 9.2(a) of the APCA (35 P.S. § 4009.2) to only use fees for "the elimination of air pollution." Since the auction proceeds generated as a result of this final-form rulemaking would be used to reduce GHG emissions, further eliminating air pollution, the fees would be used to support the "air pollution control program" in accordance with section 6.3(a) of the APCA.

Under RGGI, regulated EGUs are required to purchase one CO_2 allowance per ton of CO_2 they emit through multistate auctions or on the secondary market. The proceeds of the multistate auctions are then provided back to the participating states. The purchase of CO_2 allowances generating auction proceeds is a fee because these purchases are one component of the "regulatory measures intended to cover the cost of administering a regulatory scheme authorized under the police power of the government." See *City of Philadelphia v. Southeastern Pennsylvania Transp. Auth.*, 303 A.2d 247, 251 (1973). As mentioned previously, RGGI provides a "two-prong" approach to reducing CO_2 emissions from fossil fuel-fired EGUs. The second prong involves the proper investment of the auction proceeds to further reduce CO_2 emissions, as well as other harmful GHG emissions. This investment therefore fulfills the purpose and administration of this final-form rulemaking. This final-form rulemaking does not create a tax which is a "revenue-producing measure authorized under the taxing power of the government." *Id.* The intent of RGGI is not to generate revenue for general government or public purposes, but to achieve a common goal of reducing CO_2 emissions from EGUs.

As provided under section 9.2(a) of the APCA (35 P.S. § 4009.2(a)), this Commonwealth's auction proceeds will be held in a subaccount within the Clean Air Fund, which is administered by the Department "for the use in the elimination of air pollution." Section 9.2(a) of the APCA authorizes the Department to establish separate accounts in the Clean Air Fund as may be necessary or appropriate to implement the requirements of the APCA. Under section 9.2(a) of the APCA, the Board was required to adopt a regulation for the management and use of the money in the Clean Air Fund. The Board adopted Chapter 143 (relating to disbursements from the Clean Air Fund) to provide for the monies paid into the Clean Air Fund to be disbursed at the discretion of the Secretary for use in the elimination of air pollution. See 25 Pa. Code § 143.1(a) (relating to general). Under § 143.1(b), the full and normal range of activities of the Department are considered to contribute to the elimination of air pollution, including purchase of contractual services and payment of the costs of a public project necessary to abate air pollution.

Lastly, Section 5(a)(1) of the APCA provides the Board with authority to establish a CO_2 Budget Trading Program through this final-form rulemaking. As mentioned previously, this Commonwealth has and continues to participate in cap and trade programs. Specifically, the Board promulgated the NO_x Budget Trading Program in Chapter 145, Subchapter A (relating to NO_x Budget Trading Program) and the CAIR NO_x and SO_2 Trading Programs in Chapter 145, Subchapter D (relating to CAIR NO_x and SO_2 Trading Programs). See 30 Pa.B. 4899 (September 23, 2000) and 38 Pa.B. 1705 (April 12, 2008). Although those cap and trade program regulations were promulgated in response to initiatives at the Federal level, both subchapters were promulgated under the broad authority of section 5(a)(1) of the APCA, as is this final-form rulemaking. The statutory authority granted to the Board under section 5(a)(1) of the APCA is broad related to the adoption of any rule or regulation for the "prevention, control, reduction and abatement of air pollution." The comprehensive scope of this directive provides the Board with the discretion to promulgate a trading program to reduce CO_2 emissions from fossil fuel-fired EGUs in this Commonwealth.

Given the urgency of the climate crisis, including the significant impacts to this Commonwealth, the Board determined that this final-form rulemaking is necessary to help achieve the significant reductions in CO_2 emissions necessary to avoid the worst impacts of climate change. As one of the top GHG emitting states in the country, the Board has a compelling interest to reduce GHG emissions to address climate change and protect public health, welfare and the environment.

(12) How does this regulation compare with those of the other states? How will this affect Pennsylvania's ability to compete with other states?

There are eleven states currently participating in RGGI, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont and Virginia. Since all the participating states' regulations are based on the RGGI Model Rule, this final-form rulemaking is very similar to the regulations in the participating states, with modifications made to accommodate the unique aspects of this Commonwealth's power sector.

Comparison with RGGI Participating States

As mentioned previously, the participating states developed a Model Rule to use as the framework for each state's independent CO_2 Budget Trading Program regulation. The development of the RGGI Model Rule was supported by an extensive regional stakeholder process that engaged the regulated community, environmental non-profits and other organizations with technical expertise in the design of cap and trade programs. The Board is familiar with the structure of the RGGI Model Rule, because it was drafted based on the language in the EPA's NO_x Budget Trading Program rule in 40 CFR Part 96 (relating to NO_x budget trading program and CAIR NO_x and SO_2 trading programs for state implementation plans), which the Board used as a model for Chapter 145, Subchapter A.

States that participate in RGGI develop regulations that are compatible with the RGGI Model Rule to ensure consistency among the individual programs. Key areas of compatibility include alignment of the main program elements, stringency of the CO_2 allowance budgets and consistency of regulatory language. This consistency is necessary to ensure the fungibility of CO_2 allowances across the participating states, which supports the regional trading of CO_2 allowances and the use of a CO_2 allowance issued in one participating state for compliance by a regulated source in another participating state.

This final-form rulemaking therefore adopts the main program elements of the RGGI Model Rule, including the definitions, applicability, standard regulatory requirements, monitoring and reporting requirements, the CO_2 Allowance Tracking System (COATS), the emissions containment reserve (ECR), the cost containment reserve (CCR) and the CO_2 emissions offset project provisions. The CO_2 allowance budgets in this final-form rulemaking are sufficiently stringent to align with RGGI's goal of reducing CO_2 emissions by 30% from 2020 to 2030. This final-form rulemaking also contains regulatory language consistent with the RGGI, Inc. auction platform, the online platform used to sell CO_2 allowances. RGGI, Inc. is a nonprofit corporation created to provide technical and administrative support services to the participating states in the development and implementation of their CO_2 Budget Trading Programs. Each participating state is also allotted two positions on the Board of Directors of RGGI, Inc.

Under this final-form rulemaking, RGGI, Inc. would provide technical and administrative services to support the Department's implementation of this final-form rulemaking. This support would include maintaining COATS and the auction platform and providing assistance with market monitoring. Any assistance provided by RGGI, Inc. would follow the requirements of this final-form rulemaking. RGGI, Inc. has neither any regulatory or enforcement authority within this Commonwealth nor the ability to restrict or interfere with the Department's implementation of this final-form rulemaking.

Each participating state's regulation provides for the distribution of CO_2 allowances from its CO_2 allowance budget. The majority of CO_2 allowances are distributed at auction and each CO_2 allowance sold at auction returns proceeds from the sale to that state to invest in energy efficiency, renewable energy, and GHG abatement programs. Some states have elected to designate a limited amount of CO_2 allowances to

be "set-aside" in a designated account and distributed to advance individual state policy goals and objectives. Since this final-form rulemaking is consistent with the RGGI Model Rule, the Commonwealth's CO_2 allowances will have equal value to CO_2 allowances held in the other participating states, meaning they may be freely acquired and traded across the region.

Although CO_2 allocation provisions may vary from state to state, to be consistent with the RGGI Model Rule each participating state allocates a minimum of 25% of its CO_2 allowance budget to a general account from which CO_2 allowances will be sold or distributed in order to provide funds for energy efficiency measures, renewable or noncarbon-emitting energy technologies, and CO_2 emissions abatement technologies, as well as programmatic costs. Consistent with the RGGI Model Rule, this final-form rulemaking establishes a general account from which CO_2 allowances will be sold or distributed, which is labeled as the Department's air pollution reduction account. Each year, the Department will allocate CO_2 allowances representing 100% of the tons of CO_2 emitted from the Commonwealth's CO_2 allowance budget to the air pollution reduction account, except for the CO_2 allowances that the Department has set aside for a designated purpose as discussed in the following section. CO_2 allowances in the air pollution reduction account will be sold or distributed in order to provide funds for use in the elimination of air pollution and programmatic costs.

While this final-form rulemaking is sufficiently consistent with the Model Rule and corresponding regulations in the participating states, the Board, in the exercise of its own independent rulemaking authority, also accounts for the unique environmental, energy and economic intricacies of this Commonwealth. This provides the Board the flexibility to limit CO_2 emissions from fossil fuel-fired EGUs in a way that aligns with the other participating states, while tailoring this final-form rulemaking to this Commonwealth's energy markets. In this final-form rulemaking, the Board made modifications from the language in the Model Rule to include permitting requirements and definitions specific to this Commonwealth, as well as stylistic changes. The Board also made adjustments to the language, including the adjustment for banked allowances and control periods, to reflect the timing of this Commonwealth's participation in RGGI. In addition to these modifications, there are six main areas in which this final-form rulemaking differs from the Model Rule.

First, under § 145.306(b)(3) (relating to standard requirements), the Department is making an annual commitment to assess changes in emissions and air quality in this Commonwealth as it relates to implementation of this final-form rulemaking. The Board received several comments that requested monitoring of the air quality impacts of this final-form rulemaking and in particular an assessment of any impacts on environmental justice communities. The Department also heard concerns about potential impacts on environmental justice communities from members of EJAB. To address these concerns, the Department is committing to providing an Annual Air Quality Impact Assessment. The report will include at a minimum the baseline air emissions data from each CO_2 budget unit for the calendar year prior to the year this Commonwealth becomes a participating state and the annual emissions measurements provided from each unit. The Department will not only be assessing the CO_2 emission data provided under the requirements of this final-form rulemaking but will be assessing the entirety of the data submitted from each CO_2 budget unit as required under the Department's regulations. The Department will assess the emission data to determine whether areas of this Commonwealth have been disproportionately impacted by increased air pollution as a result of implementation of this final-form rulemaking. The Department will also publish notice of the availability of the report and the determination in the *Pennsylvania Bulletin* on an annual basis.

Second, under § 145.342(i) (relating to CO_2 allowance allocations), the Department will set aside 10,400,000 CO_2 allowances at the beginning of each year for waste coal-fired units located in this

Commonwealth. The amount of the set aside increased in this final-form rulemaking from 9,300,000 CO_2 allowances at proposed to account for one of the waste coal-fired units remaining in operation. That waste coal-fired unit had originally indicated it was shutting down operations when the Department was developing the proposed rulemaking. Since that waste coal-fired unit will remain in operation, its legacy emissions are now included in this final-form rulemaking. Legacy emissions, as defined under § 145.302, for that waste coal-fired unit amount to 1.1 million tons of CO_2 or 1.1 million CO_2 allowances. The Department added the 1.1 million to the proposed amount of 9.3 million which resulted in the set aside being 10,400,000 CO_2 allowances in this final-form rulemaking. The Department took into consideration all comments submitted pertaining to the waste coal set-aside and made the determination to maintain the set-aside provision, as well as the definition of legacy emissions that was included in the proposed rulemaking. The Department made this determination because waste coal-fired units provide an environmental benefit of reducing the amount of waste coal piles in this Commonwealth.

Reducing waste coal piles is a significant environmental issue in this Commonwealth, because waste coal piles cause air and water pollution, as well as safety concerns. Waste coal-fired units burn waste coal to generate electricity, thereby reducing the size, number and impacts of these piles otherwise abandoned and allowed to mobilize and negatively impact air and water quality in this Commonwealth. In recent years, waste coal-fired units have struggled to compete in the energy market, due in part to low natural gas prices, and several units have shut down or announced anticipated closure dates. Given the environmental benefit provided, the Board determined that it is necessary to encourage owners or operators of waste coal-fired units to continue burning waste coal to generate electricity. This legacy environmental issue from this Commonwealth's long history of coal mining further underscores why it is vital to not leave additional environmental issues, like climate change, for future generations to solve.

By providing a set aside, as opposed to an exemption, the CO_2 emissions from waste coal-fired units are included in this Commonwealth's CO_2 emissions budget and owners or operators of waste coal-fired units are still required to satisfy compliance of all the regulatory requirements in this final-form rulemaking. After reviewing the last 5 years of CO_2 emission data from waste coal-fired units, the Department determined that the CO_2 allowance set aside should be equal to the total of each waste coal-fired unit's highest year of CO_2 emissions from that 5-year period, referred to as “legacy emissions.” That total is 10,400,000 tons of CO_2 emissions. Thus, the Department will set aside 10,400,000 CO_2 allowances annually. Each year, the Department will allocate the CO_2 allowances directly to the compliance accounts of the waste coal-fired units equal to the unit's actual emissions. However, if the waste coal-fired units emit over 10,400,000 tons of CO_2 emissions sector-wide in any year, then the units must acquire the remaining CO_2 allowances needed to satisfy their compliance obligation.

Third, under § 145.342(j), the Department will set aside CO_2 allowances for a strategic use allocation. By April 1 of each calendar year, the Department will allocate any undistributed CO_2 allowances from the waste coal set-aside to the strategic use set-aside account. Given the possibility that waste coal fired-units may emit less than 10.4 million tons of CO_2 each year, the Department could be left with undistributed CO_2 allowances. Under the strategic use set-aside, the Department will allocate these undistributed CO_2 allowances directly to eligible projects that result in GHG emission reductions. Eligible projects include those that implement energy efficiency measures, implement renewable or noncarbon-emitting energy technologies, or develop innovative greenhouse gas emissions abatement technologies. In response to comments received, in this final-form rulemaking, the Department adjusted the strategic use set-aside provision to further clarify the process to apply for CO_2 allowances. The owner of an eligible project will need to submit a complete strategic use application to the Department. At a minimum the application must specify how the project will result in GHG emission reductions, the number of CO_2 allowances requested, and the calculations and supporting data used to determine the emission reductions. After verifying that

the information in the application is complete and accurate, the Department will determine the number of CO_2 allowances to distribute based on the emission reductions achieved. The Department will then distribute CO_2 allowances upon completion of the eligible project and will not award CO_2 allowances to an eligible project that is required under law, regulation, or court order.

Fourth, under § 145.342(k), the Department will set-aside CO_2 allowances for combined heat and power units. The proposed rulemaking included a set-aside provision for cogeneration units, which also covered combined heat and power (CHP) systems. In this final-form rulemaking, the Department changed the name of the set-aside from "cogeneration" to "combined heat and power." This change was made to clarify that it is CHP units that will be qualified for CO_2 allowances under the set-aside provision. A CHP unit is defined as an electric-generating unit that simultaneously produces both electricity and useful thermal energy. Due to the efficiency and environmental benefits that CHP units provide; the Department understands that it is beneficial to incentivize new CHP buildout in this Commonwealth. In addition, incentivizing future CHP units provides economic development benefits and can be a significant factor for manufacturers and other industrial, commercial or institutional facilities looking to expand operations within or to this Commonwealth. In fact, the most recent Pennsylvania Climate Action Plan recognized the benefits and importance of incentivizing CHP. In the proposed rulemaking, the Department included a set provision that involved adjusting the compliance obligation of a CHP unit. As proposed, the Department would have adjusted the compliance obligation by reducing the total CO_2 emissions by an amount equal to the CO_2 that is emitted as a result of providing useful thermal energy or electricity, or both, supplied directly to a co-located facility during the allocation year. In this final-form rulemaking, the Department instead includes two tiers for the retirement of CO_2 allowances from the combined heat and power set-aside account. Under the first tier, which is an addition at final-form, applicable combined heat and power units may request that the Department retire CO_2 allowances equal to the total amount of CO_2 emitted as a result of providing all useful thermal energy and electricity during each allocation year. Under the second tier, which was included in the proposed rulemaking, applicable combined heat and power units may request that the Department retire CO_2 allowances equal to the partial amount of CO_2 emitted as a result of supplying useful thermal energy or electricity, or both, to an interconnected industrial, institutional or commercial facility during the allocation year. This two-tier approach aligns the overall environmental benefits of CHP units with the CO_2 allowances that may be requested.

As in the proposed rulemaking, the combined heat and power units must submit a complete application to request that CO_2 allowances be retired by the Department on behalf of the unit. The Department added in this final-form rulemaking that if the unit is requesting total retirement of CO_2 allowances, then the unit must satisfy the more stringent requirements. The unit must submit an application including documentation that the useful thermal energy is at least 25% of the total energy output of the combined heat and power unit on an annual basis and that the overall efficiency of the combined heat and power unit is at least 60% on an annual basis. If the unit is requesting partial retirement of CO_2 allowances, the unit must submit an application which includes documentation of the amount of useful thermal energy or electricity, or both, supplied to an interconnected industrial, institutional or commercial facility. Unlike the waste coal set-aside, the Department would not distribute CO_2 allowances directly to the unit, but rather retire CO_2 allowances on behalf of the unit to reduce its compliance obligation. The owner or operator of a unit requiring additional CO_2 allowances to satisfy the CO_2 requirements under § 145.306(c) shall transfer CO_2 allowances for compliance deductions to the compliance account of the unit.

Fifth, under § 145.305 (relating to limited exemption for CO_2 budget units with electrical output to the electric grid restricted by permit conditions), the Board provides additional flexibility in the form of a limited exemption for CHP units that are interconnected and supply power to an industrial, institutional or commercial facility. In the proposed rulemaking, the interconnected facility was required to be a

manufacturing facility. In response to comments received, in this final-form rulemaking, the Department broadened the language to allow for the interconnected facility to be an industrial, institutional or commercial facility. A CHP unit that supplies less than 15% of its annual total useful energy to the electric grid, not including energy sent to the interconnected facility, does not have a compliance obligation under this final-form rulemaking. The owner or operator of the CHP unit claiming this limited exemption must have a permit issued by the Department containing a condition restricting the supply to the electric grid. This limited exemption is in addition to the exemption in the RGGI Model Rule for fossil fuel-fired EGUs with a capacity of 25 MWe or greater that supply less than 10% of annual gross generation to the electric grid. The Board is including this additional exemption for CHP units that primarily send energy to an interconnected facility because these CHP units provide a CO_2 emission reduction benefit. These units provide useful thermal energy, a byproduct of electricity generation, to the interconnected facility which helps prevent the need for the facility to run additional boilers onsite to generate electricity which in turn avoids additional CO_2 emissions.

Lastly, this final-form rulemaking includes §§ 145.401—145.409 (relating to CO_2 allowance auctions) outlining the procedure for auctioning CO_2 allowances, which is not contained in the RGGI Model Rule. Several participating states have also added auction procedure language to their CO_2 Budget Trading Program regulations or developed separate auction regulations. By including the auction procedure in this final-form rulemaking, the Board seeks to ensure that auction participants fully understand the auction process and the associated requirements.

In § 145.401 (relating to auction of CO_2 allowances), the Board includes a provision for the Department to participate in multistate CO_2 allowance auctions in coordination with other participating states based on specific conditions. First, a multistate auction capability and process must be in place for the participating states. A multistate auction must also provide benefits to this Commonwealth that meet or exceed the benefits conferred on this Commonwealth through a Pennsylvania-run auction process. The criteria that the Department will use to determine if the multistate auction "meets or exceeds the benefits" of a Pennsylvania-run auction are whether the auction results in reduced emissions and environmental, public health and welfare, and economic benefits. As discussed throughout this RAF, participation in RGGI would provide those benefits to this Commonwealth. Additionally, the multistate auction process must be consistent with the process described in this final-form rulemaking and include monitoring of each CO_2 allowance auction by an independent market monitor. Since the multistate auctions conducted by RGGI, Inc. satisfy all four of the conditions, the Department will participate in the multistate auctions. However, the Board also states that if the Department finds these four conditions are no longer met, the Department may determine to conduct a Pennsylvania-run auction. By including the ability to conduct a Pennsylvania-run action in this final-form rulemaking, the Board provides for flexibility in case the benefits of the multistate auctions diminish in the future.

Competition in Interstate Electricity Market

This Commonwealth generates more electricity than it consumes, exporting the remaining electricity to other states within PJM. States within PJM compete with one another in interstate electricity markets. State level policies can impact that market unevenly as generators may have varying costs depending on their location.

Not all states within PJM participate in RGGI, so generators in non-participating states may have different costs associated with electricity generation. The Department conducted an analysis evaluating possible impacts on this Commonwealth's ability to compete in the interstate electricity generation market if this final-form rulemaking is implemented.

In the 2020 modeling, the Department found that this Commonwealth will continue to export electricity to other states and this Commonwealth's total generation is not eroded as a result of RGGI participation. In fact, if the auction proceeds are invested in the energy sector, the 2020 modeling estimates that total electricity exports from this Commonwealth will be higher by 2030 with this final-form rulemaking than without it. Further, any price differential resulting from the addition of the CO_2 allowance price is not significant enough to cause EGUs to close and reopen in surrounding states. EGUs in this Commonwealth have historically maintained a competitive advantage regarding natural gas prices due to the proximity to the Marcellus and Utica shale formations. Even with the price adder of the CO_2 allowance price, the modeling shows that natural gas generation in this Commonwealth continues to be extremely competitive.[60] As shown in Table 5 below, 2021 modeling confirms this Commonwealth's power prices (capacity and energy) remain competitive in the region when compared to the current and future power prices of the participating states.

Table 5. Firm Power Prices, 2021 Modeling (2017 $/MWh).

	2020	2022	2025	2028	2030
MA	$ 49.3	$ 48.2	$ 37.9	$ 37.4	$ 32.9
CT	$ 44.8	$ 42.3	$ 33.6	$ 33.9	$ 34.5
ME	$ 40.1	$ 41.6	$ 35.0	$ 35.5	$ 34.2
NH	$ 40.9	$ 40.9	$ 33.8	$ 34.9	$ 34.6
RI	$ 49.2	$ 45.6	$ 36.8	$ 38.7	$ 41.0
VT	$ 43.9	$ 44.8	$ 38.4	$ 39.0	$ 38.1
NY	$ 35.6	$ 42.6	$ 39.6	$ 34.6	$ 31.1
CT	$ 33.0	$ 38.3	$ 34.6	$ 35.2	$ 34.8
MD	$ 30.9	$ 34.3	$ 32.6	$ 33.2	$ 33.4
VA	$ 28.4	$ 32.9	$ 32.1	$ 32.4	$ 32.4
NJ	$ 34.2	$ 36.2	$ 32.3	$ 32.6	$ 31.8
11-state RGGI	$ 39.1	$ 40.7	$ 35.1	$ 35.2	$ 34.4
PA	$ 26.2	$ 30.5	$ 30.5	$ 31.4	$ 31.3

(13) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

No other regulations of the Department or other state agencies are affected by this final-form rulemaking.

[60] ICF, Energy Assessment Report for the Commonwealth of Pennsylvania, April 2019, http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1451239&DocName=ENERGY%20ASSESSMENT%20REPORT%20FOR%20THE%20COMMONWEALTH%20OF%20PENNSYLVANIA.PDF%20%20%20%3cspan%20style%3D%22color:blue%3b%22%3e%28NEW%29%3c/span%3e.

(14) Describe the communications with and solicitation of input from the public, any advisory council/group, small businesses and groups representing small businesses in the development and drafting of the regulation. List the specific persons and/or groups who were involved. ("Small business" is defined in Section 3 of the Regulatory Review Act, Act 76 of 2012.)

As required under the Regulatory Review Act (RRA) (71 P.S. §§ 745.1—745.15) and further emphasized by Executive Order 2019-07, the Department conducted a robust public outreach effort including the business community, energy producers, energy suppliers, organized labor, environmental groups, low-income and environmental justice advocates and others to ensure that the development and implementation of this program results in reduced emissions, economic gains and consumer savings. The Department, working with the Public Utility Commission (PUC), engaged with PJM Interconnection to promote the integration of the CO_2 Budget Trading program in a manner that preserves orderly and competitive economic dispatch within PJM and minimizes emissions leakage. The Department also met with various stakeholders to receive additional input on this final-form rulemaking on numerous occasions throughout the development process. In particular, the Department met with environmental groups, residents, businesses, legislators, owners and operators of affected sources, industry groups and environmental justice stakeholders during the development of this final-form rulemaking.

Additionally, the Department consulted with the Air Quality Technical Advisory Committee (AQTAC), the Citizens Advisory Council (CAC), the Small Business Compliance Advisory Committee (SBCAC), and the Environmental Justice Advisory Board (EJAB) throughout the development of this final-form rulemaking.

Air Quality Technical Advisory Committee (AQTAC)

AQTAC was established under section 7.6 of the APCA (35 P.S. § 4007.6) to provide technical advice at the request of the Department on policies, guidance and regulations. On December 12, 2019, the Department presented concepts to AQTAC on a potential rulemaking to participate in RGGI. The Department returned to AQTAC on February 13, 2020, to discuss the preliminary draft proposed Annex A. At the April 16, 2020, AQTAC meeting, the Department provided a brief update on the development of the draft proposed rulemaking. In response to requests from committee members for more opportunities to learn about the CO_2 Budget Trading Program, on April 23, 2020, the Department presented on and provided the modeling results associated with the draft proposed rulemaking in a Special Joint Informational Meeting of AQTAC and CAC. The meeting was held by means of a webinar and over 225 members of the public were able to listen to the modeling results. Individuals interested in hearing the modeling results can also watch the meeting at any time through a link on the Department's web site.

On May 7, 2020, the draft proposed rulemaking was presented to AQTAC for review and technical advice before the Department moved the draft proposed rulemaking forward to the Board for consideration. The meeting was held by means of a webinar and over 200 members of the public had the opportunity to listen to the discussion and to request to provide comments. The AQTAC members were divided on whether to submit a formal letter of concurrence on the draft proposed rulemaking and ultimately declined to do so without a majority decision.

On April 8, 2021, the Department presented an update on this final-form rulemaking to AQTAC. The update included information on the regulatory process, a summary of the comments received, the Department's key proposed regulatory changes from proposed to final, and the Department's public outreach efforts. On May 17, 2021, at a special AQTAC meeting, the Department presented this final-form rulemaking and updated power sector modeling results. After the Department answered the members

remaining questions on this final-form rulemaking, the members voted in support of recommending that the Department move this final-form rulemaking forward to the Board. The supportive vote is particularly notable considering that the same committee had been divided on whether to concur with the draft proposed rulemaking.

The opportunity to provide public comment on the draft proposed rulemaking to AQTAC members was provided on three occasions, at the February 13, 2020, April 16, 2020, and May 7, 2020, AQTAC meetings. Additionally, the opportunity to provide public comment on this final-form rulemaking to AQTAC members was provided on April 8, 2021, and May 17, 2021.

Citizens Advisory Council (CAC)

Under section 7.6 of the APCA, the Department is required to consult with CAC in the development of the Department's regulations and State Implementation Plans. On November 19, 2019, the Department presented concepts to CAC on a potential rulemaking to participate in RGGI. The Department returned to CAC on February 18, 2020, for an informational presentation on a preliminary draft proposed Annex A. On April 23, 2020, the Department presented on and provided the modeling results associated with the draft proposed rulemaking in a Special Joint Informational Meeting of AQTAC and CAC. The Department also conferred with CAC's Policy and Regulatory Oversight Committee concerning the draft proposed rulemaking on May 8, 2020. At the May 19, 2020, CAC meeting, the draft proposed rulemaking was presented to CAC for review before the Department moved the draft proposed rulemaking forward to the Board for consideration. The CAC members ultimately declined to submit a formal letter of concurrence with the Department's recommendation to move the draft proposed rulemaking forward to the Board for consideration.
On April 20, 2021, the Department presented an update on this final-form rulemaking to CAC. The update included information on the regulatory process, a summary of the comments received, the Department’s key proposed regulatory changes from proposed to final, and the Department’s public outreach efforts. On May 19, 2021, the Department presented this final-form rulemaking and updated power sector modeling results to CAC. After the Department answered the members remaining questions on this final-form rulemaking, the members voted in support of recommending that the Department move this final-form rulemaking forward to the Board. Again, the supportive vote is particularly notable considering that the same committee had been divided on whether to concur with the draft proposed rulemaking.

The opportunity to provide public comment on the draft proposed rulemaking to CAC members was provided on three occasions, at the November 19, 2019, February 18, 2020, and May 19, 2020, CAC meetings. Additionally, the opportunity to provide public comment on this final-form rulemaking to CAC members was provided on April 20, 2021, and May 19, 2021.

Small Business Compliance Advisory Committee (SBCAC)

Under section 7.8 of the APCA (35 P.S. § 4007.8), the SBCAC is required to review and advise the Department on rulemakings which affect small business stationary sources. The Department provided informational presentations on the draft proposed rulemaking to SBCAC on January 22, 2020, and April 22, 2020. On July 22, 2020, the Department presented the draft proposed rulemaking to SBCAC for review and advice on the potential small business stationary source impact of the draft proposed rulemaking. During the presentation, the Department mentioned that it had estimated that ten small business stationary sources, as defined under section 3 of the APCA (35 P.S. § 4003), may need to comply with the draft proposed rulemaking. Of those ten sources, seven were estimated to be waste coal-fired power plants. The Department also mentioned that it had included in the draft proposed rulemaking a

CO_2 allowance set-aside provision to assist all waste coal-fired power plants located in this Commonwealth with their compliance obligation. The SBCAC ultimately voted not to concur with the Department's recommendation to move the draft proposed rulemaking forward to the Board.

On May 19, 2021, the Department presented this final-form rulemaking and updated power sector modeling results to SBCAC. During the presentation, the Department mentioned that it had estimated that now twelve small business stationary sources, as defined under section 3 of the APCA (35 P.S. § 4003), may need to comply with this final-form rulemaking. Of those twelve sources, eight were estimated to be waste coal-fired power plants. The Department also mentioned that, in the final-form rulemaking, it had retained the CO_2 allowance set-aside provision to assist all waste coal-fired power plants located in this Commonwealth with their compliance obligation. After the Department answered the members' remaining questions on this final-form rulemaking, the members voted in support of recommending that the Department move this final-form rulemaking forward to the Board. In light of the SBCAC vote in opposition to the draft proposed rulemaking, the members' support of this final-form rulemaking is particularly significant.

Environmental Justice Advisory Board (EJAB)

Additionally, the Department provided an informational presentation on the draft proposed rulemaking to EJAB on May 21, 2020, and had further engagement with Environmental Justice stakeholder groups such as the Chester Environmental Partnership and EJ Stakeholders Group throughout 2020. On July 16, 2020, the Department participated in a discussion with EJAB members centered around recommendations to the Department regarding RGGI. This conversation continued at the August 11, 2020, meeting and resulted in recommendations shared with the Department regarding RGGI program implementation in addition to review and discussion of the draft RGGI equity principles, developed in conjunction with the Advisory Committee. Discussion and consultation with EJAB regarding the draft RGGI Equity Principles continued during the November 17, 2020, meeting.

On May 20, 2021, the Department provided a presentation on the final rulemaking and updated power sector modeling, specifically highlighting environmental justice and equity concerns and how these were addressed in the rulemaking and would be addressed in an investment plan. The Delta Institute, with whom the Department collaborated to conduct outreach and research in communities impacted by this final-form rulemaking, also presented their findings and recommendations for the Department's efforts in affected communities. The Department also provided an opportunity to present public comments at this meeting. While EJAB did not vote on the draft proposed rulemaking in 2020, the EJAB members decided to vote unanimously in support of the Department moving this final-form rulemaking forward to the Board.

Other Advisory Committees

The Department also provided informational presentations on the draft proposed rulemaking to the Climate Change Advisory Committee on February 25, 2020, and the Oil and Gas Technical Advisory Board on May 20, 2020. Additionally, the Department provided updates to these committees on this final-form rulemaking.

(15) Identify the types and number of persons, businesses, small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012) and organizations which will be affected by the regulation. How are they affected?

Under § 145.304 (relating to applicability) of this final-form rulemaking, the owner or operator of a fossil-fuel-fired EGU with a nameplate capacity equal to or greater than 25 MWe that sends more than 10% of its annual gross generation to the electric grid will have a compliance obligation. These regulated EGUs are referred to as "CO_2 budget units" and a facility that includes one or more CO_2 budget units is a "CO_2 budget source." Under § 145.306 (relating to standard requirements) of this final-form rulemaking, the owner or operator of each CO_2 budget source will be required to have a permit under Chapter 127 (relating to construction, modification, reactivation and operation of sources) which incorporates the requirements of the CO_2 Budget Trading Program. The owner or operator will be required to operate the CO_2 budget source and each CO_2 budget unit at the source in compliance with the permit.

Based on the most recent data from the EPA's Clean Air Market Division, the EIA and the Department's emission inventory, the Department estimates that as of the end of 2020, 63 CO_2 budget sources (facilities) with 150 CO_2 budget units (EGUs) would have a compliance obligation under this final-form rulemaking. However, due to the dynamic nature of the electricity generation sector, the number of covered facilities will likely change by the time this final-form rulemaking is implemented. The Department projects based on announced closures and future firm capacity builds that in 2022, there will be 66 CO_2 budget sources with 158 CO_2 budget units with a compliance obligation under this final-form rulemaking. The Department conducted an analysis of power sector emissions and the facilities that meet the applicability criteria in this final-form rulemaking and determined that around 99% of this Commonwealth's power sector CO_2 emissions would be covered under this final-form rulemaking.

The Department used the North American Industry Classification System (NAICS) codes for the subject industry sectors to develop lists of potentially affected entities. The NAICS identifies the industry as Electric Bulk Power Transmission and Control (NAICS code 221112 and 221121), Other Electric Power Generation (NAICS code 221118), Electric Power Distribution (NAICS code 221122), and Paper (except Newsprint) Mills facility (NAICS code 322121). The Department provided these NAICS codes to the Pennsylvania Small Business Development Center's Environmental Management Assistance Program (EMAP) with a request for a list of entities in each classification. EMAP provided the Department with a list of 58 facility owners or operators identified by NAICS code 221112, three facility owners or operators identified by NAICS code 221121, one facility owner or operator identified by NAICS code 221118, one facility owner or operator identified by NAICS code 221122, and three facility owners or operators identified by NAICS code 322121, for a total of 66 potentially affected entities. Under the U.S. Small Business Administration (SBA) Small Business Size Regulations under 13 CFR Chapter 1, Part 121, the small business-size standard in number of employees for each of these NAICS classifications is 750 employees. The Department determined that twelve of these potentially affected entities may be small businesses by that definition. Of these twelve entities, eight are waste coal facilities, for which a set-aside provision has been established to assist these facilities with most if not all of their compliance obligation under this final-form rulemaking.

Within the participating states and under this final-form rulemaking, the owner or operator of a CO_2 budget unit must obtain one CO_2 allowance for each ton of CO_2 emitted from the CO_2 budget unit each year. The owner or operator may use a CO_2 allowance issued by any participating state to demonstrate compliance with any state's regulation, including this final-form rulemaking. RGGI operates on three-year control periods for compliance, meaning full compliance is evaluated at the end of each three-year control period. As described under § 145.306(c), at the end of a control period, the owner or operator is

required as a permit condition to hold enough CO_2 allowances in their compliance account to cover the CO_2 budget source's CO_2 emissions during the period. The owner or operator must also show interim control period compliance during each of the first two calendar years of a control period. During each interim control period, the owner or operator must hold CO_2 allowances equal to 50% of CO_2 emissions in the compliance account for the CO_2 budget source. As outlined under § 145.355 (relating to compliance), at the end of the control period or interim control period, CO_2 allowances will be deducted from each CO_2 budget source's compliance account to cover each of the CO_2 budget unit's CO_2 emissions at the source for the control period or interim control period.

All owners or operators of CO_2 budget sources are required to open a compliance account in COATS in order to transfer and hold CO_2 allowances for compliance purposes. The Department will use COATS to determine compliance with this final-form rulemaking by comparing the covered emissions of a CO_2 budget source with the CO_2 allowances held in its compliance account. COATS is a publicly accessible platform that records and tracks data for each state's CO_2 Budget Trading Program, including the transfer of CO_2 allowances that are offered for sale by the participating states and purchased in the quarterly auctions. On the COATS website, the public can view and download reports of RGGI program data and CO_2 allowance market activity. COATS is used to allocate, award and transfer CO_2 allowances, to certify and provide CO_2 allowances for compliance-related tasks, and to register and submit applications and reports for offset projects.

Under § 145.352 (establishment of accounts) of this final-form rulemaking, any person may apply to open a general account for the purpose of holding and transferring CO_2 allowances by submitting a complete application for a general account to the Department or its agent. A general account can be used for the receipt, transfer, and banking of CO_2 allowances in COATS, but unlike a compliance account, it does not provide for the CO_2 allowance compliance deduction process outlined in this final-form rulemaking. A compliance account is associated with an electric generation facility regulated under a state CO_2 Budget Trading Program, a CO_2 budget source. These accounts are used for compliance with the requirements of each state's CO_2 Budget Trading Program. Only one compliance account will be assigned to each CO_2 budget source. An applicant must have either a general or compliance account to participate in CO_2 allowance auctions. CO_2 allowances can be "banked" meaning they may be held for future compliance as they have no expiration date.

CO_2 allowances may be acquired through purchases in quarterly multistate auctions, through secondary markets, or by obtaining CO_2 offset allowances. Once a CO_2 allowance is purchased in an auction, it can then be resold in the secondary market. The secondary market assists with compliance by allowing CO_2 allowances to be traded in between quarterly auctions. As previously mentioned, every auction is overseen by an independent market monitor. Trading in the secondary market is also monitored by an independent market monitor in order to identify anticompetitive conduct. The quarterly multistate auction process continues each consecutive year of the CO_2 Budget Trading Program with fewer CO_2 allowances distributed into the auctions by the participating states each year.

Of the twelve potentially affected entities that may qualify as small businesses per the U.S. Small Business Administration definition, eight are waste coal facilities. These waste coal facilities will not need to purchase CO_2 allowances, as long as the waste coal-fired units do not emit over 10,400,000 tons of CO_2 emissions sector-wide in any year. The remaining four facilities will need to acquire CO_2 allowances in quarterly auctions, secondary markets, or by obtaining CO_2 offset allowances through the completion of offset projects, as described above. The Department's modeling projects that a CO_2 allowance will cost $3.24 (2017$) in 2022, so the estimated cost for these facilities in 2022 will be their CO_2 emissions multiplied by that allowance price.

There could also be minimal costs beyond the cost of purchasing CO_2 allowances. The Department estimates that the costs related to monitoring, recordkeeping and reporting will be minimal as this final-form rulemaking utilizes current methods and, in most instances, will require no additional emissions reporting. For instance, the continuous emission monitoring required under this final-form rulemaking is already in existence at the regulated source and the necessary emissions data is currently reported to the EPA. There may be minimal programmatic costs related to the submittal of compliance certification reports and auction, account and offset project related forms. The RGGI auction services provider estimates that the owner, operator or authorized representative on their behalf, will need to spend approximately 16 hours for the initial auction participation (including opening a COATS account, registration, and training). In subsequent auctions, the estimate drops to about 4-8 hours for each auction. Therefore, after the initial auction, the total hourly commitment from one employee of each affected facility is estimated to be an average of 24 hours per year.

RGGI Provides Regulatory Certainty

Although RGGI is a market-based approach, there are also price fluctuation protections that are built into the auction platform to help ensure that CO_2 allowance prices are predictable. Specifically, there are auction mechanisms that identify a precipitous increase or decrease in price, and trigger what are referred to as the CCR and ECR. The CCR process triggers additional CO_2 allowances to be offered for sale in the case of higher than projected emissions reduction costs. Similarly, states implementing the ECR, including this Commonwealth, will withhold CO_2 allowances from the auction to secure additional emissions reductions if prices fall below the established trigger price, so that the ECR will only trigger if emission reduction costs are lower than projected. This provides predictability in terms of the cost of compliance for covered entities. CO_2 allowances may also be purchased through the secondary market when costs are low and held for future compliance years.

Offsets

As an additional compliance option under this final-form rulemaking, owners or operators of CO_2 budget sources may complete an offset project to reduce or avoid atmospheric loading of CO_2 or CO_2 equivalent (CO_2e) emissions. CO_2e refers to the quantity of a given GHG, other than CO_2, multiplied by its global warming potential. By completing an offset project, the owner or operator will generate CO_2 offset allowances which can be used to offset a portion of the CO_2 budget source's emissions. A CO_2 offset allowance is equivalent to a CO_2 allowance, however a CO_2 offset allowance represents a project-based GHG emission reduction outside of the electric generation sector. This project must be in addition to not in place of an existing legal requirement. Under § 145.355(a)(3) of this final-form rulemaking, consistent with the RGGI Model Rule and the regulations in the participating states, the number of CO_2 offset allowances available to be deducted for compliance purposes may not exceed 3.3% of the CO_2 budget source's CO_2 emissions for a control period or interim control period.

As described under § 145.395 (relating to CO_2 emissions offset project standards), the three eligible offset categories include landfill methane capture and destruction projects, projects that sequester carbon due to reforestation, improved forest management or avoided conversion, and projects that avoid methane emissions from agricultural manure management operations. Each of the three offsets categories are designed to further reduce or sequester emissions of CO_2 or methane within the northeast region. In the RGGI Model Rule, the participating states cooperatively developed prescriptive regulatory requirements for each of the offset categories that have been incorporated into this final-form rulemaking. These

requirements ensure that awarded CO_2 offset allowances represent CO_2e emission reductions or carbon sequestration that are real, additional, verifiable, enforceable and permanent.

Under § 145.393 (relating to general requirements) of this final-form rulemaking, offset projects must be located in this Commonwealth or partly in this Commonwealth and partly within one or more of the participating states, provided that the majority of the CO_2e emission reductions or carbon sequestration occur in this Commonwealth. Massachusetts, New Hampshire, Rhode Island and Virginia have determined not to award CO_2 offset allowances, but CO_2 budget sources located within those states may use CO_2 offset allowances awarded by a participating state, including this Commonwealth. By recognizing CO_2e emission reductions and carbon sequestration outside the electric generation sector and this Commonwealth's CO_2 emissions budget offset projects provide compliance flexibility and create opportunities for low-cost emission reductions and other co-benefits across various sectors. Thus, including offset projects in this final-form rulemaking provides two crucial benefits, an additional compliance option for owners or operators and the potential for this Commonwealth to further reduce GHG emissions.

Compliance Assistance Plan

The Department will continue to educate and assist the public and the regulated community in understanding the final-form requirements and how to comply with them throughout the rulemaking process. The Department will continue to work with the Department's provider of Small Business Stationary Source Technical and Environmental Compliance Assistance. These services are currently provided by EMAP of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, Section 507 of the CAA (42 U.S.C.A. § 7661f) and authorized by the Pennsylvania Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209).

In addition to providing one-on-one consulting assistance and on-site assessments, EMAP also operates a toll-free phone line to field questions from this Commonwealth's small businesses, as well as businesses wishing to start up in, or relocate to, this Commonwealth. EMAP operates and maintains a resource-rich environmental assistance website and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

(16) List the persons, groups or entities, including small businesses, that will be required to comply with the regulation. Approximate the number that will be required to comply.

The owner or operator of a fossil-fuel-fired EGU with a nameplate capacity equal to or greater than 25 MWe that sends more than 10% of its annual gross generation to the electric grid will have a compliance obligation under this final-form rulemaking.

Based on the most recent data from the EPA's Clean Air Market Division, the EIA and the Department's emission inventory, the Department estimates that as of the end of 2020, 63 CO_2 budget sources (facilities) with 150 CO_2 budget units (EGUs) would have a compliance obligation under this final-form rulemaking. However, due to the dynamic nature of the electricity generation sector, the number of covered facilities will likely change by the time this final-form rulemaking is implemented. The Department projects based on announced closures and future firm capacity builds that in 2022, there will be 66 CO_2 budget sources with 158 CO_2 budget units with a compliance obligation under this final-form rulemaking.

About twelve of these potentially affected facilities may meet the definition of small business as defined in Section 3 of the Regulatory Review Act (71 P.S. § 745.3). Of these twelve potential facilities, eight of them are classified as waste coal facilities. This final-form rulemaking includes a waste-coal set aside provision to assist these facilities with compliance by providing up to 10.4 million CO_2 allowances each year.

The Department conducted an analysis of power sector emissions and the facilities that meet the applicability criteria in this final-form rulemaking and determined that around 99% of this Commonwealth's power sector CO_2 emissions would be covered under this final-form rulemaking. The number and type of facilities that will be affected by this final-form rulemaking are listed below in Table 6.

Table 6. Affected Facilities and EGUs By Fuel Type.

Category	Facilities (2020)	EGUs (2020)	Facilities (2022)	EGUs (2022)
Coal	6	13	5	12
Waste Coal	11	15	10	14
Natural Gas Combined Cycle	24	60	28	67
Natural Gas Single Cycle	14	41	14	41
Oil/Gas Boiler	4	11	4	11
Combined Heat & Power	4	10	5	13
Total	63	150	66	158

(17) Identify the financial, economic and social impact of the regulation on individuals, small businesses, businesses and labor communities and other public and private organizations. Evaluate the benefits expected as a result of the regulation.

Owners or operators of fossil fuel-fired EGUs, within this Commonwealth, with a nameplate capacity equal to or greater than 25 MWe that send more than 10% of annual gross generation to the electric grid will have a compliance obligation under this final-form rulemaking. While those with a compliance obligation are limited, the benefits of this final-form rulemaking will accrue to all residents of this Commonwealth.

The CO_2 emission reductions resulting from this final-form rulemaking are substantial and are the catalyst needed to meet the climate goals for this Commonwealth, as outlined in Executive Order 2019-01, to reduce net GHG emissions Statewide by 26% by 2025 from 2005 levels and by 80% by 2050 from 2005 levels. A predicted reduction from the Department's 2021 modeling of approximately 11 million metric tons of CO_2 per year due to this Commonwealth's potential participation in RGGI provides significant assurance that along with prudent investments of auction proceeds and other GHG abatement activities, this Commonwealth will remain on track to reach the 2025 net GHG reduction goal.

The participating states together, including this Commonwealth, will achieve regional CO_2 emissions reductions of 30% by 2030. According to data from the World Bank, by 2022, based on GDP, the participating states would comprise the third largest economy in the world.[61] These CO_2 emission

[61] The World Bank, Calculation based on GDP (current US$), 2019, https://data.worldbank.org/indicator/NY.GDP.MKTP.CD.

reductions are even more significant when viewed from this collective impact. Reductions in CO_2 emissions will help decrease the adverse impacts of climate change on human health, the environment and the economy. Specifically, CO_2 emission reductions may decrease costs from extreme weather events and climate-related ailments that also result in increased health care costs.

The Department's modeling indicates that there may be some future emissions leakage in terms of additional fossil fuel emissions outside of this Commonwealth's borders. Emissions leakage is the shifting of emissions from states with carbon pricing to states without carbon pricing. This leakage has no bearing on the environmental, health or economic benefits of this final-form rulemaking, and merely means that a portion of the emissions reductions achieved within this Commonwealth may shift to other states or areas without carbon pricing. Additionally, this final-form rulemaking will result in a net emissions reduction of 28 million tons of CO_2 across the broader PJM region through 2030.

It is important to note that the modeling results assume the only policy change impacting the power sector in the region between 2021 and 2030 is this Commonwealth's participation in RGGI. The Department finds that extremely unlikely given the ongoing efforts by PJM, the Federal Energy Regulatory Commission (FERC) and the Federal government. The Department has been an active participant in PJM's Carbon Pricing Senior Task Force which is conducting additional modeling in an effort to better understand and control leakage across the entire PJM region. The FERC hosted a carbon pricing technical conference in the Fall of 2020, resulting in a policy statement requesting public comment on issues such as how to address shifting generation amongst states as a result of carbon pricing. Lastly, the Federal administration is seeking to reduce carbon emissions from the electric power sector, specifically aiming to produce 80% of the nation's electricity from zero-carbon sources. The Department anticipates actions at the regional and Federal level will mitigate potential leakage impacts that may result from this final-form rulemaking.

Benefits of this Final-Form Rulemaking

Environmental and Health Benefits

As documented above, this final-form rulemaking would effectuate least cost CO_2 emission reductions for the years 2022 through 2030. The declining CO_2 Emissions Budget in this final-form rulemaking directly results in CO_2 emission reductions of around 20 million short tons in this Commonwealth as well as emission reductions across the broader PJM regional electric grid. However, the Department projects that 97—227 million short tons of CO_2 that would have been emitted within this Commonwealth over the next decade are avoided by this Commonwealth's participation in RGGI. Additionally, this final-form rulemaking will result in a net emissions reduction of 28 million tons of CO_2 across the broader PJM region through 2030.

While the benefits of the cumulative CO_2 emission reductions will be tremendous. The Department also estimates that this final-form rulemaking will lead to a reduction of co-pollutants. Based on the Department's 2020 modeling, this final-form rulemaking would provide public health benefits due to the expected reductions in emissions of CO_2 and the ancillary emission reductions or co-benefits of SO_2 and NO_x reductions. The Department's modeling projects cumulative emission reductions of 112,000 tons of NO_x and around 67,000 tons of SO_2 over the decade.

These co-pollutant reductions are significant because NO_x and SO_2 pollution leads to several public health issues. For instance, short-term exposure to SO_2 emissions can be harmful to public health because it

impacts the ability to breathe especially in children and those with asthma.[62] NO_x can also cause irritation in the respiratory system. In particular, long-term exposure to elevated NO_x levels may contribute to asthma, and potentially increased susceptibility to respiratory infections and lead to increased hospital admissions.[63]

Based on an assumption that 188 million tons of CO_2 emissions are avoided through 2030, the Department estimated that between 283 and 641 premature deaths will be avoided in this Commonwealth due to emission reductions resulting directly from this final-form rulemaking.

Children and adults alike will suffer less from respiratory illnesses. The methodology projects 31,000 fewer incidences of upper and lower respiratory symptoms which will lead to reduced emergency department visits and avoided hospital admissions. Healthier children will be able to play more, as incidences of minor restricted-activity days decline on the order of almost 500,000 days between now and 2030. Adults would be healthier as well. The methodology projects over 83,000 avoided lost workdays due to health impacts.

The public health benefits to this Commonwealth of these avoided SO_2 and NO_x emissions range between $2.79 billion to $6.3 billion by 2030, averaging between $232 million to $525 million per year.

Economic Benefits

The results of this modeling show there is an increase in employment as a result of this final-form rulemaking in every year from 2023 through 2030. Cumulatively, the modeling scenario results show an increase of over 30,000 job-years through 2030 and 67,387 job-years through 2050. There are continued increases in employment beyond 2030 through 2050 due to lingering benefits of this final-form rulemaking; primarily due to electric bill savings from energy efficiency and distributed generation installed with 20-year equipment lifetimes. The modeling also shows an increase in GSP that trends similarly to employment. This final-form rulemaking is expected to lead to an increase in GSP of $1.9 billion between now and 2030.

All impacts in the modeling scenario are very small in the context of this Commonwealth's entire economy. Annual changes in employment range from -0.03% to 0.07%, GSP from -0.06% to 0.07%, and cumulatively both are less than a 0.05% increase in 2030 or 2050. Disposable personal income results are slightly negative through 2030 but do increase between 2030 and 2050 as shown by the cumulative increase in undiscounted disposable income of $7.2 billion ($3.6 billion with a 3% discount rate) through 2050. It is important to note that the decrease in disposable income out to 2030 is overall very small, equal to approximately $8.50 per year for someone on a $50,000 salary. Up until 2030 there are two countervailing impacts to disposable income with positive pressure from the increase in economic activity in the economy as evidenced by the increased jobs and GSP as well as electric bill savings associated with energy efficiency and distributed generation. However, there are some short-term price impacts to ratepayers due to this final-form rulemaking as well as from revenue decoupling though these trends reverse in the future.

Investment of Auction Proceeds

Auction proceeds are available to the Department to be invested in programs and projects that would further eliminate air pollution in this Commonwealth.

[62] EPA, Sulfur Dioxide (SO_2) Pollution, https://www.epa.gov/so2-pollution/sulfur-dioxide-basics#what%20is%20so2
[63] EPA, Particulate Pollution and Your Health, September 2003, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1001EX6.txt.

For the purposes of modeling the impacts of investing the proceeds, assumptions were made that the proceeds would be distributed to support the program so that 31% are invested in energy efficiency, 32% in renewable energy and 31% in GHG abatement with 6% remaining to cover any costs related to management of the CO_2 Budget Trading Program, 5% for the Department and 1% for RGGI, Inc. The modeling estimates auction proceeds to be from $171 million to $330 million annually.

The results of the modeling show that this final-form rulemaking will not only combat climate change and improve air quality, but also provide positive economic value to this Commonwealth. These results align with the numerous published studies highlighting the corresponding positive financial and economic impacts of RGGI participation.

Additionally, 2020 economic modeling indicates that these investments not only spur economic benefits but also result in the addition of 9.4 GW of renewable energy and load reduction of 29 TWh of electricity from energy efficiency projects. This addition of carbon free generation and reduction in electricity demand would further bolster the benefits of this final-form rulemaking. This increases the amount of electricity exported from this Commonwealth, further drives down emissions and compliance costs for facilities, and results in a reduction of electricity prices in 2029 below what they would have been without this final-form rulemaking. This is consistent with the electricity prices in the participating states, which since the beginning of the RGGI program have not seen an increase in electricity costs.

By using auction proceeds to invest in energy efficiency and renewable energy programs, this will help offset any potential increased costs to electricity prices by decreasing peak demand and offering low cost electricity to the grid. In fact, the Acadia Center conducted an analysis of electricity costs for all states that participated in RGGI compared to states in the rest of the country and found that electricity prices in RGGI states have fallen by 5.7% while prices have increased in the rest of the country by 8.6%.[64]

Table 7. Pennsylvania Auction Proceeds through 2030.

Year	PA Effective Budget	CO_2 Allowance Price	Total Auction Proceeds
2022	57,884,281	$3.24	$187,312,734
2023	55,643,848	$3.30	$183,394,622
2024	53,403,415	$3.36	$179,267,370
2025	51,162,982	$3.42	$174,924,582
2026	48,922,549	$3.49	$170,550,488
2027	46,682,116	$3.55	$165,937,032
2028	44,441,683	$3.62	$161,076,497
2029	42,201,250	$3.45	$145,489,052
2030	39,960,817	$3.28	$131,039,637

[64]Acadia Center, "The Regional Greenhouse Gas Initiative 10 Years in Review," 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

The process for modeling the auction proceeds involved three broad sets of inputs to the REMI model: investment changes in the power sector as a result of this final-form rulemaking, ratepayer impacts as a result of this final-form rulemaking, and impacts from investment of the auction proceeds. Outputs of investment changes in the power sector consist of investments in new generation, retirements, and changes to variable and fixed operating and maintenance costs, fuel inputs, and price impacts. Ratepayer impacts are associated with changes in wholesale electricity prices due to this final-form rulemaking (CO_2 allowance price impact) and investment of auction proceeds (e.g., price changes from load reductions).

For investment of auction proceeds, each investment category (energy efficiency, renewable energy, GHG abatement) has associated investments that are funded by the costs associated with the CO_2 allowance price (i.e., impacts to electricity prices in the power sector that occur due to this final-form rulemaking). In addition, the Department assumed leverage ratios whereby investment of the auction proceeds incentivizes additional private dollars for investment. This private funding has associated opportunity costs that are modeled in REMI. Private (e.g., households and business) budgets are assumed to be fixed and modeling investment in one category (e.g., energy efficiency) requires giving up investments in business as usual activities.

Impact to the Regulated Community

Owners or operators of fossil fuel-fired EGUs, within this Commonwealth, with a nameplate capacity equal to or greater than 25 MWe that send more than 10% of annual gross generation to the electric grid will have a compliance obligation under this final-form rulemaking. Conversely, a fossil fuel-fired EGU, within this Commonwealth, with a nameplate capacity equal to or greater than 25 MWe that sends more than 15% of annual gross generation to the electric grid will have a compliance obligation if it is interconnected to a commercial, industrial or institutional facility.

Based on historic data, the Department anticipates that on January 1, 2022 there will be 66 facilities, operating 158 individual EGUs that may have a compliance obligation under this final-form rulemaking. The individual EGU number is greater than the number of facilities as many facilities have more than one EGU. Each qualifying EGU has a potential compliance obligation under this final-form rulemaking. While 66 facilities may potentially have a compliance obligation, each individual facility needs to determine whether they have a compliance obligation and for which of their EGUs. Some of these facilities may have a compliance obligation for some or all of their EGUs and some may modify processes, run times or employ additional efficiency measures that may exclude them from a compliance obligation all together, or merely reduce covered emissions.

These covered EGUs are then required to acquire one CO_2 allowance per ton of CO_2 they emit. There are exceptions to this, for example if the EGU qualifies for one of the limited exemptions contained in this final-form rulemaking excluding certain EGUs based on the amount of electricity that is sold to the grid. Furthermore, the Department established three set-aside programs through which qualifying entities can receive an allocation of CO_2 allowances to assist with all or a portion of their compliance obligation. Of the 66 facilities potentially subject to this final-form rulemaking, 10 waste coal facilities qualify for the waste coal set-aside and potentially 5 facilities qualify for the combined heat and power set-aside.

These regulated facilities have flexibility as to how they acquire CO_2 allowances necessary for compliance. The majority of regulated entities will likely acquire the CO_2 allowances through the multistate quarterly auctions. Additionally, there is an extremely active secondary market through which CO_2 allowances can also be bought and sold. Finally, this final-form rulemaking includes an offset provision, whereby CO_2 offset allowances can be assigned to eligible projects that further offset GHG

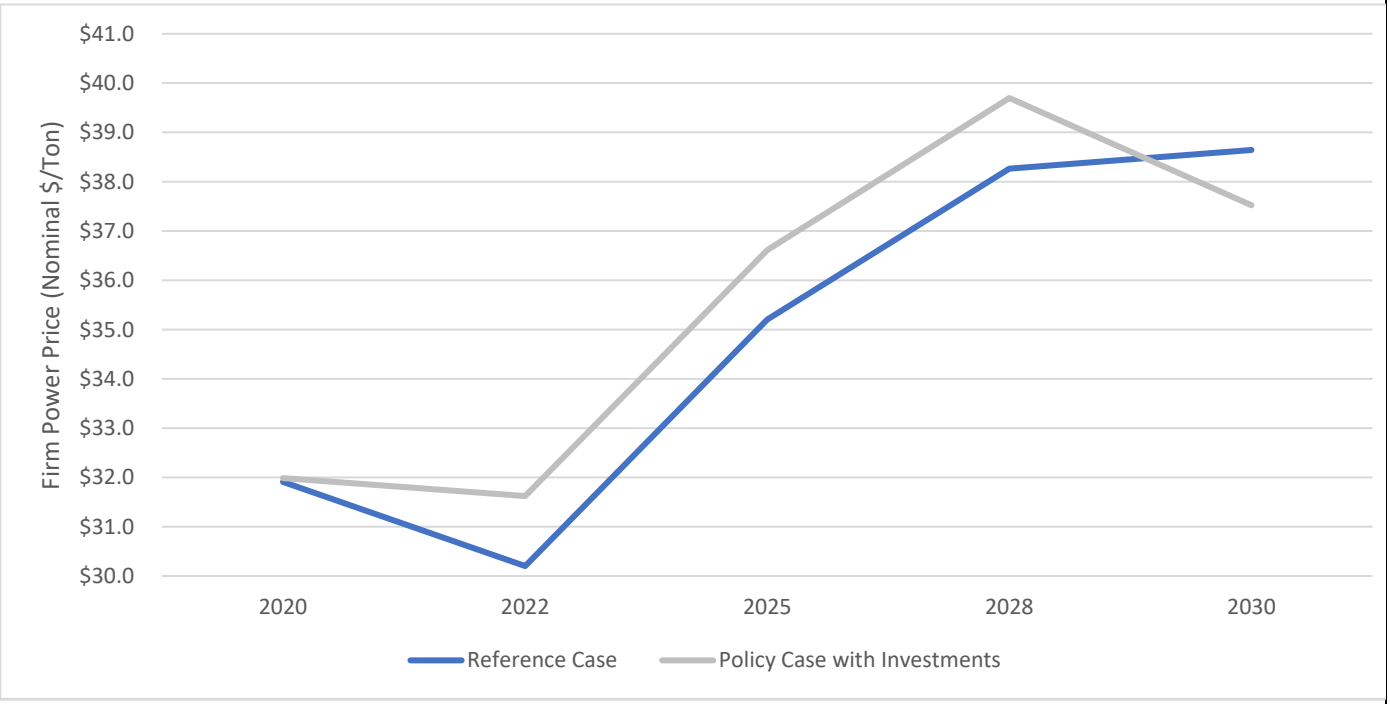
emissions, outside of the electricity sector, which can be used for compliance with this final-form rulemaking.

The amount of fees estimated to be paid by the regulated community is a function of the CO_2 allowance price and this Commonwealth's "effective budget," which is the amount of CO_2 allowances that the Department will have remaining in its budget after deducting CO_2 allowances from the air pollution reduction account for the set aside allocations and the ECR. The Department's 2021 modeling estimates this amount to be around $187 million in 2022 and around $131 million in 2030 from the sale of CO_2 allowances in multistate auctions as seen in Table 7 above.

Electric Consumer Impact

According to the Department's 2020 modeling, this Commonwealth's projected firm power prices after implementation of this final-form rulemaking are expected to be lower than prices would be without this final-form rulemaking, as seen in Figure 2.

Figure 2. Comparison of Firm Power Prices Through 2030 (2020 Modeling).



Based on the Department's 2021 modeling, it can be expected that at least 25% of the cost of compliance would be borne by out-of-state electric consumers. In 2022, this Commonwealth's net electricity exports are estimated at 51,000 gigawatt hours (GWh), representing 25% of this Commonwealth's 2022 electricity generation of 201,221 GWh.[65] As a result, without factoring in the strategic investment of auction proceeds, the remaining 75% of the costs or $149 million would be borne by this Commonwealth. This percentage is also dependent on the CO_2 emissions intensity of the exported generation.

[65] Pennsylvania PUC, Electric Power Outlook for Pennsylvania 2017-2022, August 2018, www.puc.state.pa.us/General/publications_reports/pdf/EPO_2018.pdf.

According to the EIA, the major components of the United States' average price of electricity in 2020 were 56% generation, 31% distribution and 13% transmission costs.[66] This final-form rulemaking would only impact the generation portion of a consumer electric bill, which is a little more than half of the bill. The Department's 2021 modeling estimates that in 2022, wholesale energy prices will be 2.4% higher with RGGI participation. That amounts to a roughly 1.2% increase in the average retail electricity rate, which is less than the swing in prices traditionally seen as a result of seasonal fluctuations in the energy market.

The average residential electric consumer in this Commonwealth spends from $97.04 to $136.60 per month depending on whether they heat their homes with electricity or another fuel source.[67] Although electricity rates vary in this Commonwealth by Electric Distribution Company service territories, these bill amounts represent the average electricity rates across this Commonwealth.

If this final-form rulemaking is implemented and this Commonwealth begins participating in RGGI in 2022, residential electric consumer bills will increase by an estimated 1.2% in the short-term. This amounts to an additional $1.17 to $1.65 per month depending on the home heating source. However, the Department's 2020 modeling shows that this minor increase is temporary. As shown in the 2020 modeling, as a result of the fee investments from the auction proceeds, by 2030, energy prices will fall below business-as-usual prices resulting in future consumer electricity cost savings. This means electric consumers will see greater electric bill savings in the future than if this final-form proposed rulemaking were not implemented.

Based on information contained within the PUC's 2020 Rate Comparison Report,[68] a small commercial customer's usage is the closest aligned with a small business as defined by the U.S. Small Business Administration, though it is not an exact match. The PUC report indicates that average 2019 electricity consumption for this customer class is 1,000 kWh/month with total monthly bills ranging from $106.29 to $143.49 depending on the Electric Distribution Company service territory and the corresponding electricity rate. Using the same assumptions regarding the composition of an electric bill as used above, a small commercial customer using 1,000 kWh/month could expect to see a potential increase of $1.28 to $1.72 per month in 2022.

According to the PA PUC, a large commercial customer using 200,000 kWh per month has a monthly bill ranging from $11,788.08 to $21,043.18. These customers could expect to see a 2022 potential price increase of $141 to $253 per month, again depending on their electric service territory and associated rates.

Further, this Commonwealth's electricity generation mix has changed significantly over time. In 2010, coal accounted for approximately 47% of this Commonwealth's generation and natural gas accounted for approximately 15%. By 2019, coal accounted for approximately 17% of this Commonwealth's generation and natural gas accounted for approximately 43%, mainly due to the relatively low price of natural gas as a fuel source.[69] The notable shift in the power generation mix from 2010 to 2019 highlights that the electricity generation sector is dynamic and can change over time without impacts to the overall economic health of the industry and this Commonwealth.

[66] EIA, Electricity explained: Factors affecting electricity prices, Major components of the U.S. average price of electricity, 2020, https://www.eia.gov/energyexplained/electricity/prices-and-factors-affecting-prices.php

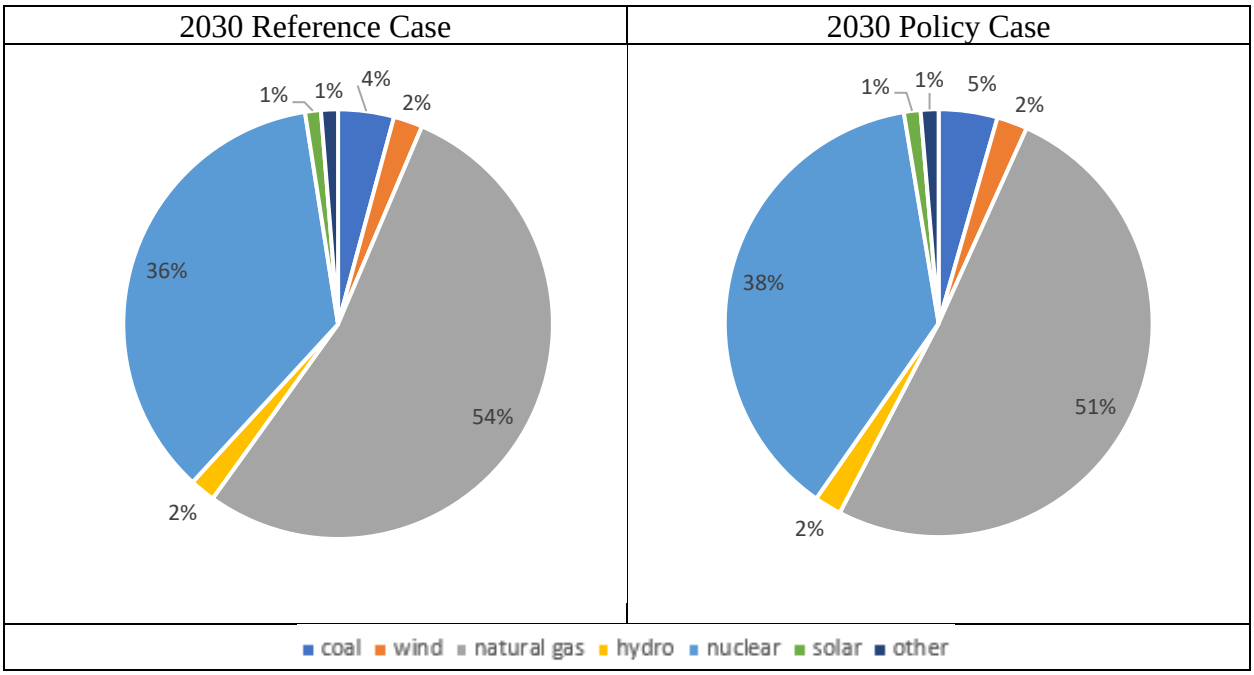
[67] Pennsylvania PUC, 2018 Collections Data for the Major Electric and Gas Companies- Chapter 14 Biennial Report, January 15, 2020, http://www.puc.pa.gov/General/publications_reports/pdf/Chapter14-Biennial_2018RCD.pdf.

[68] Pennsylvania PUC, 2020 Rate Comparison Report. https://www.puc.pa.gov/General/publications_reports/pdf/Rate_Comparison_Rpt2020.pdf

[69] EIA, State Profile and Energy Estimates: Pennsylvania, 2019, https://www.eia.gov/state/analysis.php?sid=PA.

The modeling results show that even without accounting for the proceed investments, the electricity generation sector will not be significantly changed by this final-form rulemaking. The Department projects that the differences of this Commonwealth's electricity generation mix between the Policy Case and Reference Case by 2030 is minimal, as seen in Figure 3. Even without this final-form rulemaking, the amount of coal generation will experience a precipitous decline by 2025. Although the trajectories vary, by 2025 there will be marginal differences in the amount of coal generation in this Commonwealth with or without this final-form rulemaking. As this coal-fired generation retires, new generation from natural gas and renewables will more than compensate for the lost coal generation.

Figure 3. Comparison of Pennsylvania Energy Generation (2021 Modeling).



Energy Sector Employment[70]

The historical changes to the energy sector have shown that when power generation shifts so does employment. Within the energy sector, there have been employment shifts and trends occurring over time across this Commonwealth showing the most growth in clean energy employment and slower, or negative, growth in fossil fuel energy employment.

The energy sector is a large employer of workers in this Commonwealth and one of the fastest growing employment sectors. From 2017 to 2019, this Commonwealth had a total of 269,031 traditional energy jobs, defined as jobs in electric power generation, transmission, distribution, and storage, as well as fuels, energy efficiency and motor vehicles. These jobs accounted for 4.5% of the overall Statewide workforce. Additionally, energy and energy-related employment has continued to grow over the last two years. Since 2017, traditional energy jobs have grown by 7.6%, or 8,306 new workers. Between 2018 and 2019 alone,

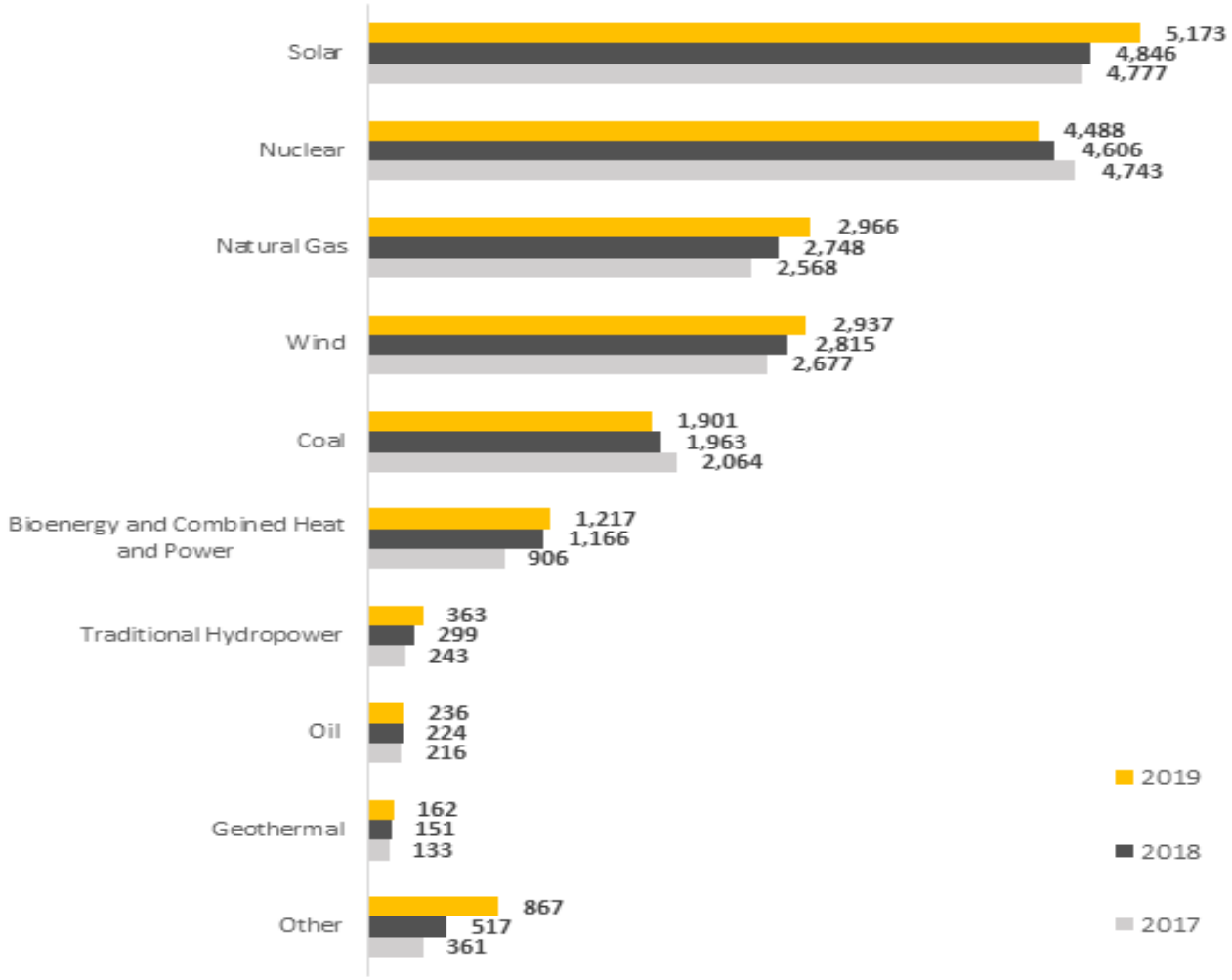
[70] BW Research Partnership. 2020 Pennsylvania Energy Employment Report and 2020 Pennsylvania Clean Energy Employment Report, https://www.dep.pa.gov/Business/Energy/OfficeofPollutionPrevention/EnergyEfficiency_Environment_and_EconomicsInitiative/Pages/Workforce-Development.aspx

traditional energy employment grew by 5.2%, or 5,757 jobs. In fact, energy jobs are growing faster than the overall labor market. In contrast, total jobs in this Commonwealth have grown by only 0.8% between 2018 and 2019 compared to 5.2% in the energy sector as a whole.

Looking more specifically at employment within the energy sector, natural gas electric power generation jobs have grown since 2017 as this Commonwealth has increased its natural gas electricity generation capacity. Since 2010, this Commonwealth's share of electricity generation from natural gas has more than doubled, while the share of coal has declined by more than half. In general, natural gas is becoming an increasingly larger share of the energy production mix in the United States. Between 2014 and 2018, natural gas production in America grew by 18.6%, and over the last two decades, natural gas production has grown by 61.2% across the country.

Coal jobs have declined by 3.3% since 2017 due to the decrease in coal generation, a nationwide phenomenon as the country moves away from coal-fueled electric power generation to cleaner burning sources. In general, coal generation jobs across the United States have decreased by 14.1%, shedding 13,132 jobs. At the same time, coal production across America has declined by 24.3% since 2014. Coal production in this Commonwealth between December 2018 and December 2019 alone declined by 21%. In comparison of employment in technologies across the energy sector, employment in coal accounted for less than wind, natural gas, nuclear and solar- with 1,901 coal jobs remaining across this Commonwealth at the end of 2019.

Figure 4. Pennsylvania Electric Power Generation Employment by Sub-Technology, 2017-2019.



This Commonwealth is also home to a significant nuclear generation workforce; this sector employs 4,488 workers. However, nuclear employment has declined by 5.7% since 2017, shedding 256 jobs. A number of the job losses in nuclear generation are likely attributable to the closure of the Three Mile Island nuclear generation facility in September 2019. However, nuclear facilities are bolstered through this final-form rulemaking because the facilities are zero-carbon emitters. This means that the facilities will not need to factor in the price of emitting CO_2 when bidding into the electricity market. In fact, in early 2020, Energy Harbor, the owner of the Beaver Valley Nuclear Plant, specifically cited this final-form rulemaking as a primary reason for withdrawing the deactivation notice previously issued for the facility. Since the Beaver Valley Nuclear Plant will continue operating, the jobs related to the facility will be retained.

Looking at overall energy jobs by fuel type, as shown in Table 8, clean energy, defined as energy efficiency, clean energy generation, alternative transportation, clean grid and storage, and clean fuels, employs over 97,000 workers, and represents 36% of employment in this Commonwealth's energy sector. Clean energy jobs have grown by 7,800 jobs since 2017, an increase of 8.7%, slightly outpacing traditional energy jobs, which have grown 7.6%. Some fuel sectors, such as natural gas, declined in job growth since 2017. By comparison, overall job growth in this Commonwealth was 0.8% between 2018 and 2019.

Table 8. Change in Pennsylvania Jobs by Fuel Type 2017 vs 2019.[71]

	Clean Energy	Natural Gas	Petroleum	Coal
Number of Jobs in PA	97,186	23,738	23,690	10,350
Job growth since 2017	+8.7%	-7.4%	+14.9%	-3.3%

Energy efficiency represents the majority of all clean energy jobs in this Commonwealth; these businesses employ 71,443 workers and employment has grown by 9.4% since 2017. Following energy efficiency, clean energy generation firms comprise 15% of total clean energy jobs. Clean energy generation firms have grown by 6.5% since 2017, creating 893 jobs for a total of 14,594 workers.

The overall proportion of clean energy jobs compared to total Statewide employment in this Commonwealth is 1.6%, comparable to New York's clean energy economy, where 1.7% of total jobs are clean energy workers. However, clean energy employment concentration in this Commonwealth is lower compared to other participating states like Massachusetts (3.5%) or Rhode Island (3.4%), signifying the potential employment growth opportunities in this Commonwealth.

Solar workers account for the largest proportion of energy generation workers in this Commonwealth and the largest share of clean energy generation workers, 35.4% of the clean energy generation labor force or 5,173 jobs. Unlike the rest of the country, solar jobs have been growing in this Commonwealth since 2017. Between 2017 and 2019, solar employment grew by 8.3% across the state from 4,777 workers to 5,173 workers at the end of 2019. By contrast, nationwide solar jobs declined by 1.2% over the same time period. The continued growth in solar jobs for this Commonwealth is likely the result of an increase in annual installations between 2018 and 2019. In 2018, this Commonwealth installed just under 60 MW of residential, non-residential, and utility-scale solar capacity. In 2019, annual installed capacity reached about 70 MW.

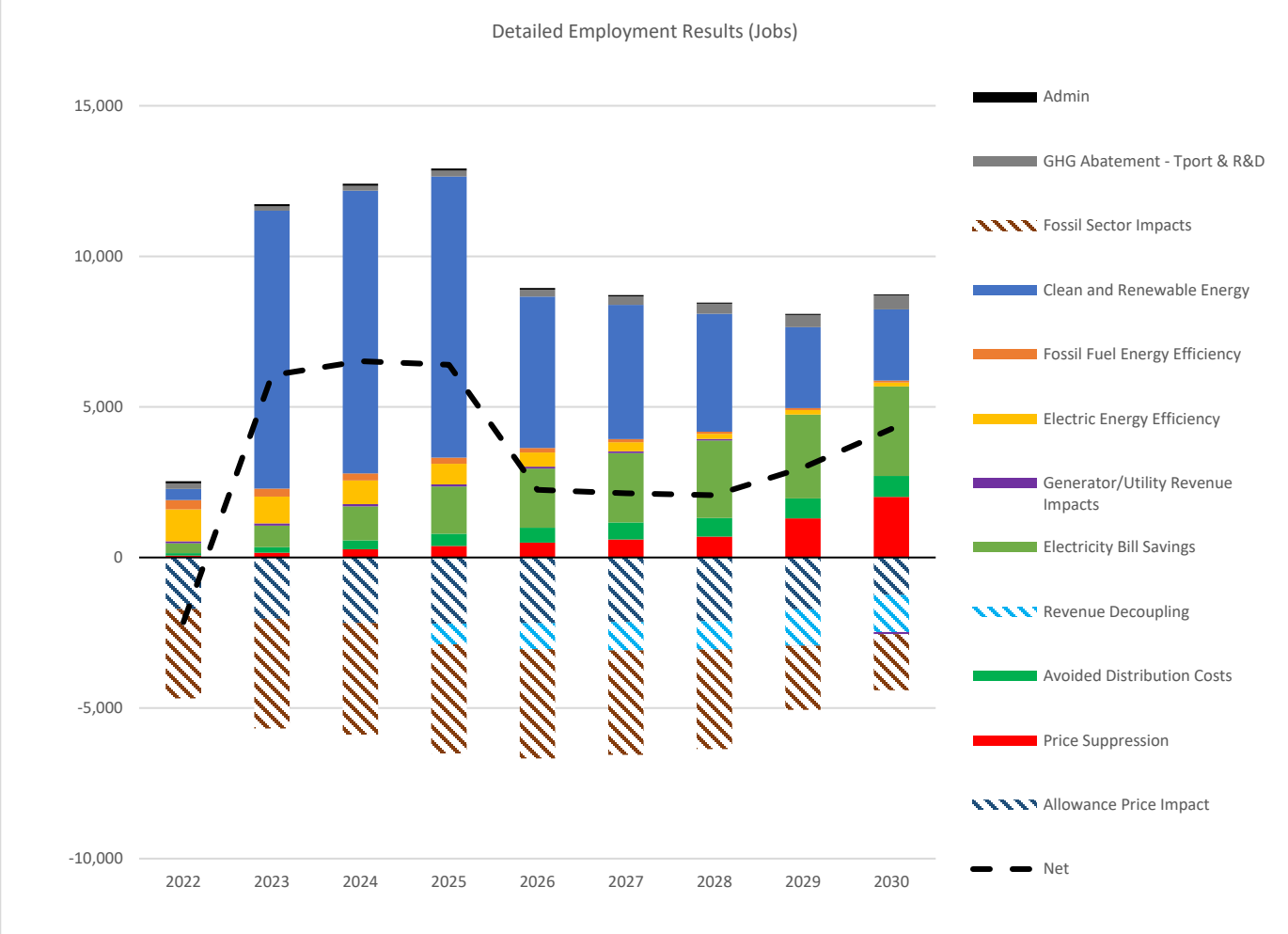
Wind energy firms continue to grow employment in this Commonwealth. The state's 2,937 wind energy generation workers account for 2.6% of all wind energy jobs across the United States. These businesses grew by 9.7% since 2017, creating 259 new clean energy jobs across this Commonwealth. Wind energy generation job growth comes alongside increased wind capacity in this Commonwealth. Since 2013, wind energy has become the largest renewable source of electricity generation, accounting for 36% of this Commonwealth's renewable electricity capacity in 2018. With significant resources along the Appalachian Mountain crests and the shoreline of Lake Erie, this Commonwealth currently boasts 726 installed wind turbines with over 1,400 MW of generating capacity. Furthermore, this Commonwealth is home to 29 manufacturing facilities that produce wind turbines, blades, towers, and other components related to wind energy technologies.

Bioenergy and CHP, traditional hydropower, low-impact hydropower, and geothermal generation technologies account for 13.7% of this Commonwealth's clean energy generation workforce and have collectively resulted in 494 new jobs since 2017, the majority of which can be attributed to the bioenergy and CHP industry. In fact, this Commonwealth is among one of the top 12 states in the country for electricity generated from biomass resources.

[71] *Id.*

The Department's modeling shows that reinvestment of auction proceeds into the energy sector will result in a net benefit to this Commonwealth. Employment contractions occurring in the coal industry, are more than countered by immense growth in clean and renewable energy, and energy efficiency sectors. The 2020 modeling estimates that from 2022 to 2030, this final-form rulemaking would lead to an increase in GSP of $1.9 billion and a net increase of over 30,000 jobs in this Commonwealth as seen in Figure 5.

Figure 5. Pennsylvania Net Jobs by Sector Through 2030.



This final-form rulemaking provides an opportunity to assist residents of this Commonwealth impacted by changes in the energy sector, as this Commonwealth and the rest of the country transitions to a new energy future. Without this final-form rulemaking, many jobs, specifically at coal-fired power plants will be lost without any opportunities for assistance to ensure there is an equitable transition for workers in all energy sectors.

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

The implementation of this final-form rulemaking will have climate, environmental and health benefits. While there is a cost associated with implementation, the benefits far outweigh any costs.

This final-form rulemaking is needed to reduce CO_2 emissions in this Commonwealth.

This Commonwealth has established Statewide goals to reduce GHG emissions by 26% by 2025 and 80% by 2050 in comparison to 2005 levels. While this Commonwealth has achieved reductions from all sectors, including the power sector, more is needed to meet these goals, set to avoid the worst impacts of climate change. This Commonwealth's participation in RGGI would provide significant assurance that prudent investments of the auction proceeds coupled with other GHG abatement activities will allow this Commonwealth to remain on track to reach the 2025 reduction goal. Without the reductions associated with the implementation of this this final-form rulemaking, this Commonwealth will fail to reach even the interim GHG reduction goal established for this Commonwealth.

While emissions from the generation sector have decreased since 2008, the current trajectory of emissions reductions in the power sector is not sustainable. There are few remaining coal-fired EGUs, which based on updated modeling are anticipated to cease most if not all generation by 2025. The air emissions gains that were realized through fuel switching (coal to natural gas) and replacing aging coal-fired facilities with new natural gas plants have mostly occurred. Moving forward, a new approach is needed to achieve further reductions. Historic trends provide no guarantee of what the emissions profile for this Commonwealth's electricity sector will look like in the future.

A more accurate projection of future emissions can be seen by modeling the power sector with and without this final-form rulemaking in effect. The modeling indicates that this Commonwealth's participation in RGGI could lead to between 97 million and 227 million tons of CO_2 reductions from sources within the Commonwealth between 2022 and 2030. These emissions reductions are going to occur in this Commonwealth and are not tied to or dependent on actions by other surrounding states. When this Commonwealth implements this final-form rulemaking, significant CO_2 emissions reductions occur within this Commonwealth. Tied to these significant emissions reductions are the resulting health impacts.

Although the methodology to determine climate and environmental impacts are complicated, calculating the health benefits is quite simple. The Department calculated the health impacts associated with the emissions reductions stemming from the implementation of this final-form rulemaking using the EPA's Benefit-per-Ton (BPT) and Incidence-per-Ton (IPT) methodology. The Department calculated that if 188 million tons of CO_2 are avoided through 2030 then this Commonwealth's residents would see cumulative health benefits amounting to $2.79—$6.3 billion. This equates to a range of $232—$525 million annually and is an extremely conservative estimate given these health benefits are only those benefits tied to the reduction of co-pollutants (NO_x, SO_x and $PM_{2.5}$) and exclude the additional benefits provided from the reduction in CO_2 emissions. Further, calculations using the social cost of carbon would result in significantly higher benefit values for this final-form rulemaking.

The analysis conducted by Penn State's Center for Energy Law and Policy estimated the health benefits of this Commonwealth's participation in RGGI to be on the order of $1 billion to $4 billion per year over the initial decade of this Commonwealth's RGGI participation, specifically noting the conservative nature of the Department's calculations. Implementation of this final-form rulemaking does come with increased costs, in terms of impacts on electricity prices. Updated modeling shows that the impact on wholesale power prices is estimated to be 2.42% in 2022 and 1.73% by 2030. These minimal prices impacts are exclusive of the price suppressing impacts of any investments to be made in the energy sector using the auction proceeds.

Expanding the focus on emissions reductions outside of this Commonwealth and across a broader region, for example, the PJM Interconnection, the regional transmission organization consisting of parts of 13 states and the District of Columbia, the emissions reductions remain despite concerns about emissions leakage. The potential for an evaluation of leakage has been a focus of PJM since the creation of RGGI as

PJM has some member states that participate in RGGI (have a carbon price) and some that do not (have no carbon price). In order to more thoroughly study the potential for leakage and the magnitude of that leakage, PJM created the Carbon Pricing Senior Task Force (CPSTF). This group, in which the Department has been an active participant, has examined the impacts of both the recent entry of Virginia into RGGI and the potential impacts of this Commonwealth's participation in RGGI. PJM's independent power sector modeling came to the same conclusions as the Department's modeling, that though there was some potential for leakage, this did not undermine the significant emissions reduction potential within this Commonwealth, nor did it undermine emissions benefits across the PJM region. Even with the potential for leakage, PJM determined that in addition to significant benefits within this Commonwealth there was a net benefit across the PJM region as well. When this is extrapolated further to the Eastern Interconnection, there continues to be a net benefit, the value of which decreases as the lens through which the reductions are viewed becomes wider.

Lastly, the Department's economic modeling shows that even with consideration of these electricity price increases, this Commonwealth's participation in RGGI will lead to a net increase of more than 30,000 jobs and add $1.9 billion to the GSP. This analysis incorporates any projected decreases to local or state tax revenue or indirect impacts economic due to decreased production or economic activity in certain sectors, such as the fossil-fuel industry. While implementation of this final-form rulemaking is not without cost; the economic and health the economic benefits are considerable and far outweigh any implementation costs.

(19) Provide a specific estimate of the costs and/or savings to the regulated community associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

This final-form rulemaking applies to owners or operators of fossil fuel-fired EGUs, within this Commonwealth, with a nameplate capacity equal to or greater than 25 MWe. This final-form rulemaking is designed to effectuate least cost CO_2 emission reductions for the years 2022 through 2030 within this Commonwealth. In addition to purchasing CO_2 allowances and completing offset projects to generate CO_2 offset allowances, CO_2 budget units may reduce their compliance obligations by reducing CO_2 emissions through other alternatives such as heat rate improvements, fuel switching and co-firing of biofuels.

To comply with this final-form rulemaking, each CO_2 budget unit within this Commonwealth will need to acquire CO_2 allowances equal to its CO_2 emissions. If CO_2 allowances are purchased through the multistate auctions, the owner or operator of a CO_2 budget unit will pay the auction CO_2 allowance price. As mentioned previously, reserved CO_2 CCR allowances can be released into the auction if allowance prices exceed predefined price levels, meaning emission reduction costs are higher than projected. The total cost of purchasing allowances will therefore vary per unit based on how much CO_2 the unit emits and the allowance price. The owner or operator may also purchase CO_2 allowances on the secondary market where they could potentially purchase CO_2 allowances at a price lower than the multistate auction allowance price. CO_2 allowances also have no expiration date and can be acquired and banked to defray future compliance costs.

Since the Department will allocate CO_2 allowances to waste coal-fired units each year up to 10,400,000 allowances sector-wide, waste coal-fired units will incur minimal compliance costs. Owners or operators of waste coal-fired units will only need to purchase CO_2 allowances if the set-aside amount is exceeded. However, waste coal-fired units still must comply with the other components of this final-form rulemaking, including incorporating the CO_2 budget trading program requirements into their permits.

The requirements established by this final-form rulemaking will require the owner or operator to submit a complete application for a new, renewed or modified permit and pay the associated fee. The application must be submitted by the later of 6 months after the effective date of this final-form rulemaking or 12 months before the date on which the CO_2 budget source, or a new unit at the source, commences operation.

The Department estimates that the costs related to monitoring, recordkeeping and reporting will be minimal as this final-form rulemaking utilizes current methods and, in most instances, will require no additional emissions reporting. For instance, the continuous emission monitoring required under this final-form rulemaking is already in existence at the regulated source and the necessary emissions data is currently reported to the EPA. There may be minimal programmatic costs related to the submittal of compliance certification reports and auction, account, and offset project related forms. The RGGI auction services provider estimates that the owner, operator or representative on their behalf, will need to spend approximately 16 hours for the initial auction participation (including opening a COATS account, registration, and training). In subsequent auctions, the estimate drops to about 4-8 hours for each subsequent auction. Therefore, after the initial auction, the total hourly commitment from one employee of each affected facility is estimated to be an average 24 hours per year. The exact cost for each affected facility varies widely depending on type of employee the affected facility dedicates to managing this effort.

Compliance costs will vary by CO_2 budget unit as the amount of CO_2 emitted is the primary driver of compliance costs. Overall CO_2 emissions are impacted by operational decisions such as run time, and by emissions intensity which varies by fuel type, and abatement technology employed. Additionally, certain sources may be eligible for set-aside allowances at no cost.

In 2022, this Commonwealth's CO_2 emissions from CO_2 budget sources are estimated to be 61 million short tons. Given the 3-year compliance schedule, all 61 million CO_2 allowances will not need to be purchased in the first year. The total amount of CO_2 allowances available will decline as the amount of CO_2 emissions in this Commonwealth decline.

As CO_2 budget sources would need one allowance for each ton of CO_2 emitted, the owners or operators would need to acquire 61 million CO_2 allowances at the estimated 2022 allowance price of $3.24 (2017$/Ton). If these CO_2 allowances were all purchased at quarterly multistate auctions in 2022, the total purchase cost would be approximately $198 million. The CO_2 budget sources would then most likely incorporate this compliance cost into their offer price for electricity. The price of electricity is then passed onto electric consumers. However, that does not mean that $198 million will be passed onto this Commonwealth's electric consumers.

As detailed in the response to Question 17, the average residential electric consumer in this Commonwealth spends from $97.04 to $136.60 per month depending on whether they heat their homes with electricity or another fuel source.[72] Residential bills will increase by an estimated 1.2% in the short-term. This amounts to an additional $1.17 to $1.65 per month depending on the home heating source. However, the Department's 2020 modeling shows that this minor increase is temporary. As shown in the 2020 modeling, as a result of the fee investments from the auction proceeds, by 2030, energy prices will fall below business-as-usual prices resulting in future consumer electricity costs savings. This means

[72] Pennsylvania PUC, 2018 Collections Data for the Major Electric and Gas Companies- Chapter 14 Biennial Report, January 15, 2020, http://www.puc.pa.gov/General/publications_reports/pdf/Chapter14-Biennial_2018RCD.pdf.

electric consumers will see greater electric bill savings in the future then if this final-form rulemaking were not implemented.

The Department's 2021 modeling estimates that in 2022 wholesale energy prices will be 2.4% higher with RGGI participation. That amounts to a roughly 1.2% increase in the average retail electricity rate, which is less than the swing in prices traditionally seen as a result of seasonal fluctuations in the energy market.

Based on information contained within the PUC's 2020 Rate Comparison Report,[73] a small commercial customer's usage is the closest aligned with a small business as defined by the U.S. Small Business Administration, though it is not an exact match. The PUC report indicates that average 2019 electricity consumption for this customer class is 1,000 kWh/month with total monthly bills ranging from $106.29 to $143.49 depending on the Electric Distribution Company service territory and the corresponding electricity rate. Using the same assumptions regarding the composition of an electric bill as used above, a small commercial customer using 1,000 kWh/month could expect to see a potential increase of $1.28 to $1.72 per month in 2022.

According to the PUC, a large commercial customer using 200,000 kWh per month has a monthly bill ranging from $11,788.08 to $21,043.18. These customers could expect to see a 2022 potential price increase of $141 to $253 per month, again depending on their electric service territory and associated rates.

(20) Provide a specific estimate of the costs and/or savings to the local governments associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

It is not anticipated that local governments will incur any compliance costs as a result of this final-form rulemaking.

(21) Provide a specific estimate of the costs and/or savings to the state government associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

State government does not operate any CO_2 budget sources that would be covered under this final-form rulemaking. Any State government costs would involve costs to the Department, including permit engineer review time for permit applications as a result of any new or modified permits needed to comply with this final-form rulemaking. It is anticipated that these costs will be offset by the auction proceeds.

(22) For each of the groups and entities identified in items (19)-(21) above, submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these requirements.

No new legal, accounting or consulting procedures are contained in this final-form rulemaking. The recordkeeping and reporting requirements for owners and operators of applicable sources under this final-form rulemaking are minimal because the records required are in line with the records already required to be kept for emission inventory purposes and for other Federal and State requirements. To minimize the

[73] Pennsylvania PUC, 2020 Rate Comparison Report. https://www.puc.pa.gov/General/publications_reports/pdf/Rate_Comparison_Rpt2020.pdf

burden of these requirements, the Department allows electronic submission of most planning, reporting and recordkeeping forms required by this final-form rulemaking.

COATS is an electronic platform, developed, implemented and maintained by RGGI, Inc. on behalf of the participating states, that records and tracks CO_2 emission data for each state's CO_2 Budget Trading Program. The emissions data that owners or operators report to the EPA's Clean Air Markets Division system flows through to COATS. COATS is also the platform used for each state's compliance process, meaning it is used by the participating states, including this Commonwealth, to record allocations, deductions and transfers of CO_2 allowances. Additionally, COATS allows offset project sponsors to register offset projects and submit offset project Consistency Applications and Monitoring and Verification Reports to the participating states.

(22a) Are forms required for implementation of the regulation?

Yes

(22b) If forms are required for implementation of the regulation, **attach copies of the forms here.** If your agency uses electronic forms, provide links to each form or a detailed description of the information required to be reported. **Failure to attach forms, provide links, or provide a detailed description of the information to be reported will constitute a faulty delivery of the regulation.**

There are fourteen forms required for the implementation of this regulation, all of which are outlined below and included as attachments.

1. CO_2 Budget Unit Application
2. CHP CO_2 Allowance Retirement Application Form,
3. Strategic Use Application Form,
4. Compliance Certification Form
5. Quarterly Report Form.
6. Operating Permit Modification Application
7. Offset Project Consistency Applications
    a. Landfill Methane Capture and Destruction
    b. Methane Emissions from Agricultural Manure
    c. U.S. Forest Service Reforestation
8. Accreditation of Independent Verifier
9. RGGI Auction Qualification Application
10. RGGI Bidder User Access Application
11. RGGI-COATS General Account Request Form
12. RGGI-COATS User Login Request Form

(23) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

The table below includes the projected costs to the regulated community of purchasing CO_2 allowances at estimated CO_2 allowance prices and emission levels. This does not include the minimal costs of monitoring, recordkeeping, reporting and auction participation. The numbers represented in this table mirror the numbers in Table 7, however this table represents the information in fiscal years instead of calendar years.

	Current FY (20/21)	FY +1 (21/22)	FY +2 (22/23)	FY +3 (23/24)	FY +4 (24/25)	FY +5 (25/26)
SAVINGS:	**$**	**$**	**$**	**$**	**$**	**$**
Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Savings	0.00	0.00	0.00	0.00	0.00	0.00
COSTS:						
Regulated Community	0.00	82,924,928	166,497,256	167,787,622	169,068,734	170,435,547
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Costs	0.00	82,924,928	166,497,256	167,787,622	169,068,734	170,435,547
REVENUE LOSSES:						
Regulated Community	0.00	0.00	0.00	0.00	0.00	0.00
Local Government	0.00	0.00	0.00	0.00	0.00	0.00
State Government	0.00	0.00	0.00	0.00	0.00	0.00
Total Revenue Losses	0.00	0.00	0.00	0.00	0.00	0.00

(23a) Provide the past three-year expenditure history for programs affected by the regulation.

Program	FY -2 (17/18)	FY -1 (18/19)	Current FY (19/20)	Current FY (20/21)
Environmental Program Management (161-10382)	$29,413,000	$30,932,000	$28,420,000	$32,041,000
Clean Air Fund Major Emission Facilities (215-20077)	$17,480,000	$16,067,000	$17,878,000	$20,801,000
Clean Air Fund Mobile and Area Facilities (233-20084)	$8,727,000	$7,205,000	$9,369,000	$11,290,000

(24) For any regulation that may have an adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), provide an economic impact statement that includes the following:

(a) An identification and estimate of the number of small businesses subject to the regulation.

As described in the response to Question 15, EMAP provided the Department with a list of entities in this Commonwealth identified as Electric Bulk Power Transmission and Control (NAICS code 221112 and 221121), Other Electric Power Generation (NAICS code 221118), Electric Power Distribution (NAICS code 221122), and Paper (except Newsprint) Mills facility (NAICS code 322121). The Department provided these NAICS codes to the Pennsylvania Small Business Development Center's EMAP with a request for a list of entities in each classification. EMAP provided the Department with a list of 59 facility owners and operators identified by NAICS code 221112, three facility owners or operators identified by NAICS code 221121, one facility owner or operator identified by NAICS code 221118, one facility owner or operator identified by NAICS code 221122, and three facility owners or operators identified by NAICS code 322121, for a total of 62 potentially affected entities. Under the U.S. SBA Small Business Size Regulations under 13 CFR Chapter 1, Part 121, the small business-size standard in number of employees for each of these NAICS classifications is 750 employees. The Department determined that twelve of these potentially subject entities may be small businesses by that definition.

This final-form rulemaking may also apply to owners or operators of other facilities that have not yet been identified.

(b) The projected reporting, recordkeeping and other administrative costs required for compliance with the final-form regulation, including the type of professional skills necessary for preparation of the report or record.

The recordkeeping and reporting requirements for owners or operators of affected facilities are minimal because most of the records required are in line with the records already required to be kept for emission inventory purposes and for other federal and state requirements. The owners and operators of affected facilities are familiar with the existing requirements for reporting and recordkeeping for their industry and have the professional and technical skills needed for compliance with these final-form requirements. No special skills are required, and the Department only anticipates minimal programmatic costs.

The Department plans to educate and assist the public and the regulated community in understanding the requirements and how to comply with them.

(c) A statement of probable effect on impacted small businesses.

The Department expects that the impact on small businesses will be minimal. Of the twelve potential small businesses identified, the majority are waste coal fired facilities. This final-form rulemaking would establish a waste-coal set aside account to assist these facilities with compliance by providing up to 10.4 million CO_2 allowances each year.

Small businesses would not be unduly burdened by this final-form rulemaking. Overall, small businesses would likely be impacted positively as a result of this final-form rulemaking, due to the benefits provided by the RGGI proceed investments. The potential funding programs could allow for more access to energy efficiency and renewable energy projects and investments in clean transportation options. For instance, if the Commonwealth decides to fund an orphan and abandoned well plugging program with RGGI

proceeds, the conventional oil and gas industry would benefit from the additional work being offered. Additionally, many renewable energy firms are considered small businesses, which could benefit from a rooftop solar program.

The Department plans to educate and assist the public and the regulated community in understanding the requirements and how to comply with them. The Department will continue to work with the Department's provider of Small Business Stationary Source Technical and Environmental Compliance Assistance. These services are currently provided by EMAP of the Pennsylvania Small Business Development Centers. The Department has partnered with EMAP to fulfill the Department's obligation to provide confidential technical and compliance assistance to small businesses as required by the APCA, Section 507 of the CAA (42 U.S.C.A. § 7661f) and authorized by the Pennsylvania Small Business and Household Pollution Prevention Program Act (35 P.S. §§ 6029.201—6029.209). In addition to providing one-on-one consulting assistance and on-site assessments, EMAP also operates a toll-free phone line to field questions from this Commonwealth's small businesses, as well as businesses wishing to start up in, or relocate to, Pennsylvania. EMAP operates and maintains a resource-rich environmental assistance website and distributes an electronic newsletter to educate and inform small businesses about a variety of environmental compliance issues.

(d) A description of any less intrusive or less costly alternative methods of achieving the purpose of the final-form regulation.

There are no less intrusive or less costly alternative regulatory provisions available.

(25) List any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, the elderly, small businesses, and farmers.

Provisions for Covered Facilities

The Board developed a special provision for waste coal-fired units located in this Commonwealth, 8 out of 12 of which currently appear to meet the definition of small business as defined under Section 3 of the Regulatory Review Act (71 P.S. § 745.3). As discussed in the response to question 12, the Department will set aside 10,400,000 CO_2 allowances at the beginning of each year for waste coal-fired units located in this Commonwealth. The Board is establishing this waste coal set-aside in this final-form rulemaking because in addition to electricity generation, waste coal-fired units provide an environmental benefit of reducing air and water pollution caused by the remaining waste coal piles in this Commonwealth.

While this Commonwealth's participation in RGGI will have tangible health, environmental and economic benefits, the inclusion of the waste coal set-aside has the additional benefit of avoiding unintended impacts to this generation sector, so that the environmental benefits of continuing to remediate this Commonwealth's legacy waste coal piles may continue. For context, since 1988 a total of 160.7 million tons of waste coal has been removed and burned to generate electricity, with an additional 200 million tons of coal ash beneficially used at mine sites. One of the important environmental benefits that waste coal ash provides is the neutralization of acid mine drainage, due to the use of limestone as an emission reduction additive during the combustion process. Of this Commonwealth's over 13,000 acres of waste coal piles cataloged by the Department, 3,700 acres have been reclaimed with roughly 9,000 acres remaining. Additionally, of the piles that remain, approximately 40 of them have ignited, and continually burn which significantly impacts local air quality as well as the Commonwealth's efforts to meet and maintain compliance with the NAAQS.

The Board also developed a special provision for CHP units that are interconnected and supply power to an industrial, institutional or commercial facility. Under this final-form rulemaking, units that serve an electricity generator with have a nameplate capacity equal to or greater than 25MWe and that send more than 10% of their electricity to the grid have a compliance obligation. However, a CHP unit that supplies less than or equal to 15% of its annual total useful energy to the electric grid, not including energy sent to the interconnected facility, may take a limited exemption from most of the requirements under this final-form rulemaking. In particular, the facility will not be required to obtain CO_2 allowances. The exemption is referred to as limited because the restriction on electricity supply must be included and complied with as a condition in the facility's permit and the facility must comply with the requirement to report annual gross generation to the Department under § 145.305(c). By increasing the applicability threshold by as much as 5% for eligible CHP units, the Board is providing industrial, institutional or commercial facilities that have installed on-site electric generation to support production at the facility with an opportunity to be exempted from this final-form rulemaking.

For those CHP units that do trigger a compliance requirement under this final-form rulemaking, the Board established a CHP set-aside provision to retire CO_2 allowances on behalf of qualifying CHP units. As discussed in the response to question 12, the Department included two tiers for the retirement of CO_2 allowances from the CHP set-aside account. Under the first tier, applicable CHP units may request that the Department retire CO_2 allowances equal to the total amount of CO_2 emitted as a result of providing all useful thermal energy and electricity during each allocation year. Under the second tier, applicable CHP units may request that the Department retire CO_2 allowances equal to the partial amount of CO_2 emitted as a result of supplying useful thermal energy or electricity, or both, to an interconnected industrial, institutional or commercial facility during the allocation year. This two-tier approach aligns the overall environmental benefits of CHP units with the CO_2 allowances that may be requested.

Incentivizing future CHP units provides economic development benefits and can be a significant factor for manufacturers and other industrial, commercial or institutional facilities looking to expand operations within or to this Commonwealth. The set-aside and limited exemption for CHP will benefit existing systems while encouraging new installations in this Commonwealth. CHP units use energy efficiently by simultaneously producing electricity and useful thermal energy from the same fuel source. CHP captures the wasted heat energy that is typically lost through power generation, using it to provide cost-effective heating and cooling to factories, businesses, universities and hospitals. CHP units are able to use less fuel compared to other fossil fuel-fired EGUs to produce a given energy output. Less fuel being burned results in fewer air pollutant emissions, including CO_2 and other GHGs. In addition to reducing emissions, CHP benefits the economy and businesses by improving manufacturing, industrial, commercial or institutional competitiveness through increased energy efficiency and providing a way for businesses to reduce energy costs while enhancing energy reliability. Because CHP units are interconnected with a facility, the electricity consumed on-site is not reduced due to line losses, and climate change resiliency is increased.

Special Provisions for Environmental Justice, Low Income and Minority Communities

In the Preamble to this final-form rulemaking, the Board included a set of equity principles to indicate that the Commonwealth is committed to striving to develop a power sector carbon-reduction program and investment strategy that embodies the four principles. These equity principles advance the Department's commitment to equity and were developed by the Department with input from environmental justice stakeholders, including EJAB. First, the Commonwealth will strive to inclusively gather public input using multiple methods of engaging the public, especially environmental justice communities and meaningfully consider that input in making decisions related to the design and implementation of the power sector

carbon-reduction program and disseminate any final decisions that are made that affect such impacted communities in a timely manner. Second, the Commonwealth will strive to protect public health, safety and welfare, mitigating any adverse impacts on human health, especially in environmental justice communities and seek to ensure environmental and structural racism are not replicated in the engagement process. Third, the Commonwealth will strive to work equitably and with intentional consideration to distribute environmental and economic benefits of auction proceeds in communities that have been disproportionately impacted by air pollution. As part of this third principle, the Commonwealth will seek to address legacy impacts related to emissions and pollution in vulnerable populations and among environmental justice communities. The Commonwealth will also develop and provide data about emissions in environmental justice communities to inform the investment process. Lastly, as part of the third principle, the Commonwealth will strive to provide access to investment programs for all members of the community, especially low-income communities.

To help ensure that measures taken through this final-form rulemaking do not disproportionately impact the most vulnerable residents in this Commonwealth, the Department is making an annual commitment to assess changes in emissions and air quality in this Commonwealth as it relates to implementation of this final-form rulemaking. The Board received several comments that requested monitoring of the air quality impacts of this final-form rulemaking and in particular an assessment of any impacts on environmental justice communities. The report will include at a minimum the baseline air emissions data from each CO_2 budget unit for the calendar year prior to the year this Commonwealth becomes a participating state and the annual emissions measurements provided from each unit. The Department will not only be assessing the CO_2 emission data provided under the requirements of this final-form rulemaking but will be assessing the entirety of the data submitted from each CO_2 budget unit as required under the Department's regulations. The Department will assess the emission data to determine whether areas of this Commonwealth have been disproportionately impacted by increased air pollution as a result of implementation of this final-form rulemaking. The Department will also publish notice of the availability of the report and the determination in the *Pennsylvania Bulletin* on an annual basis.

Additionally, the Department is focused on developing a strategy for the reinvestment of auction proceeds that ensures an equitable distribution of beneficial projects across this Commonwealth, with a focus on benefits for low-income consumers, environmental justice communities and communities impacted by this Commonwealth's transition to a new energy future. The potential use of the auction proceeds includes targeted weatherization and energy efficiency services to reduce energy use and costs for households and businesses, training opportunities related to energy efficiency and renewable energy careers, and the retention of jobs through repowering coal-fired facilities to natural gas, among others.

Since around 20% of CO_2 emissions from fossil fuel-fired EGUs in this Commonwealth are located in Environmental Justice areas, residents in these communities will directly benefit from the localized emission reductions from power plants located in their communities. These include reductions in CO_2, SO_2 and NO_x emissions and reduced formation of ground level ozone. Additional consideration for reinvestment opportunities will be given to Bucks, Chester, Delaware, Montgomery and Philadelphia counties as they are designated as marginal nonattainment areas for the 2015 ozone NAAQS, a standard that will become more difficult to attain with future climate change impacts.

As previously mentioned, vulnerable populations across this Commonwealth, including children, the elderly, those with pre-existing health conditions especially respiratory and communities of color are those most affected by diminished air quality. These groups are also those who have the most to gain from avoiding the worst impacts of climate change while improving the air and water quality in this Commonwealth.

Consideration of Farming & Agricultural Operations

While there is not a special provision for farming and agricultural operations, this final-form rulemaking will provide assistance to meet the particular needs of this group which has been negatively impacted by climate change. The reductions in ambient concentrations of ground-level ozone and other harmful air pollutants as a result of this final-form rulemaking will help aid farmers by improving the quality of life of animals, preserving this Commonwealth's biodiversity, and reducing veterinary costs. High levels of ground-level ozone affect animals including pets, livestock, and wildlife, in ways similar to the impact on humans described in response to question 10. Similar to various public health pressures, the agricultural, food, and water systems that Pennsylvanians depend on for survival are under threat by climate change. The increase in precipitation and its variability could lead to increased incidences of plant disease, increased risk of flooding and difficulty in the timing of planting, and increased demand for irrigation. This Commonwealth's dairy production will also experience challenges from reduced milk yields, a result of heat stress on cows. The CO_2 emission and co-pollutant reductions accomplished through implementation of this final-form rulemaking are needed to reduce the amount of climate change causing pollution resulting from fossil fuel-fired EGUs and negatively impacting this Commonwealth's farming and agricultural operations.

(26) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

The Department has not considered alternative regulatory provisions for this final-form rulemaking and this Commonwealth's participation in RGGI is the least burdensome acceptable alternative to limit CO_2 emissions from fossil fuel-fired EGUs. However, the Department included a provision in this final-form rulemaking to retain the flexibility to conduct a Pennsylvania-run auction in case the benefits of the multistate auctions diminish in the future.

While the Department could have developed a traditional command and control regulation to reduce CO_2 emissions from fossil fuel-fired EGUs, that would not be the most advantageous or economically beneficial method to control CO_2 emissions in this Commonwealth. Further, the Department was directed through Executive Order 2019-07 to develop a regulation to reduce CO_2 emissions from fossil fuel-fired EGUs through a cap and trade program.

Benefits of cap and trade v. traditional command and control

As noted by the EPA in its "Guide to Designing and Operating a Cap and Trade Program for Pollution Control," cap and trade programs provide several benefits and advantages over more traditional approaches to environmental regulation. By establishing an emissions budget, cap and trade programs can provide a greater level of environmental certainty than other environmental policy options. The regulated sources, across the region, must procure allowances to cover emissions or risk being penalized for lack of compliance. Traditional command and control regulations, on the other hand, tend to rely on variable emission rates and often only regulate existing or new sources. However, under cap and trade programs, new and existing sources must comply with the emissions budget. A cap and trade program may also encourage sources to achieve emission reductions in anticipation of future compliance, resulting in the earlier achievement of environmental and human health benefits. In fact, the Department's modeling shows that this is occurring as this Commonwealth prepares to participate in RGGI in 2022.

The EPA also noted that banking of allowances, which this final-form rulemaking allows, provides an additional incentive to reduce emissions earlier than required. Banking provides flexibility by allowing sources to save unused allowances for use in a later compliance period when the emissions budget is lower and the costs to reduce emissions may be higher. With command-and control, the regulating authority specifies sector-wide technology and performance standards that each of the affected sources must meet, whereas cap and trade provides sources with the flexibility to choose the technologies that minimize their costs while achieving the emissions target. Cap and trade programs also provide more accountability than a command and control program. Under this final-form rulemaking and other cap and trade programs, sources must account for every ton of emissions they emit by acquiring allowances. Command and control programs tend to rely on periodic inspections and assumptions that control technology is functioning properly to show compliance.[74]

This final-form rulemaking employs an efficient and market-based solution to achieve a reduction in CO_2 emissions from the electricity generation sector in this Commonwealth. This is further bolstered by the 2019 update to the Pennsylvania Climate Action Plan which determined that one of the most cost-effective emissions reduction strategies is to limit CO_2 emissions through an electricity sector cap and trade program. Although RGGI is a market-based approach, there are also price fluctuation protections that are built into the auction platform to help ensure that CO_2 allowance prices and compliance costs are feasible. Specifically, there are auction mechanisms that identify a precipitous increase or decrease in price, and trigger what are referred to as the CCR and ECR. The CCR process triggers additional CO_2 allowances to be offered for sale in the case of higher than projected CO_2 allowance costs. Similarly, states implementing the ECR, including this Commonwealth, would withhold CO_2 allowances from the auction to secure additional emissions reductions if prices fall below the established trigger price. This provides predictability in terms of the cost of compliance for covered entities. CO_2 allowances may also be purchased through the secondary market and may be held for future compliance years as they have no expiration.

Benefits of RGGI participation

As previously mentioned, cap and trade programs have an established track record as economically efficient, market-driven mechanisms for reducing pollution in a variety of contexts. Other countries and states have found that cap and trade programs are effective methods to achieve significant GHG emission reductions. RGGI is one of the most successful cap and trade programs and it is well-established with an active carbon trading market for the northeastern United States. This successful market-based program has significantly reduced and continues to reduce emissions. The participating states have collectively reduced power sector CO_2 pollution by over 45% since 2009, while experiencing per capita GDP growth and reduced energy costs. The program design of RGGI would enable the Board to regulate CO_2 emissions from the power sector in a way that is economically efficient thereby driving long-term investments in cleaner sources of energy.

Part of what makes RGGI economically efficient is that it is a regional cap and invest program, which allows EGUs to achieve least-cost compliance by buying and selling allowances in a multistate auction or in regional secondary markets. RGGI CO_2 allowances are fungible across the participating states, meaning that though this Commonwealth would have an established allowance budget for each year, this Commonwealth's allowances are available to meet the compliance obligations in any other RGGI state and vice versa at the option of the regulated sources. Therefore, CO_2 emissions from this Commonwealth's

[74] EPA, Tools of the Trade: A Guide to Designing and Operating a Cap and Trade Program for Pollution Control, EPA430-B-03-002, June 2003, www.epa.gov/sites/production/files/2016-03/documents/tools.pdf.

power sector are not limited to strictly the amount of this Commonwealth's CO_2 allowances. This cooperation allows EGUs more flexibility in terms of compliance and allows the market to continue to signal entrance and exit of generation. Though each state has its own annual allocation, compliance occurs at the regional level rather than on a state-by-state basis. In this respect, the market assists in achieving least cost compliance for all participating states.

Another benefit of participating in multistate auctions run by RGGI, Inc. is that RGGI, Inc. has retained the services of an independent market monitor to monitor the auction, CO_2 allowance holdings, and CO_2 allowance transactions, among other activities. The market monitor provides independent expert monitoring of the competitive performance and efficiency of the RGGI allowance market. This includes identifying attempts to exercise market power, collude or otherwise manipulate prices in the auction or the secondary market, or both, making recommendations regarding proposed market rule changes to improve the efficiency of the market for RGGI CO_2 allowances, and assessing whether the auctions are administered in accordance with the noticed auction rules and procedures. The market monitor will monitor bidder behavior in each auction and report to the participating states any activities that may have a material impact on the efficiency and performance of the auction. The participating states, through RGGI, Inc., release a Market Monitor Report shortly after each CO_2 allowance auction. The Market Monitor Report includes aggregate information about the auction including the dispersion of projected demand, the dispersion of bids and a summary of bid prices, showing the minimum, maximum, average and clearing price and the CO_2 allowances awarded.

RGGI has helped the participating states create jobs, save money for consumers, and improve public health, while reducing power sector emissions and transitioning to a cleaner electric grid. In an independent and nonpartisan evaluation of the first three control periods in RGGI, the Analysis Group, one of the largest economic consulting firms globally, found that the participating states experienced economic benefits in all three control periods, while reducing CO_2 emissions. The participating states added between $1.3 billion and $1.6 billion in net economic value during each of the three control periods. The participating states also showed growth in economic output, increased jobs and reduced long-run wholesale electricity costs. See Analysis Group, "The Economic Impacts of the Regional Greenhouse Gas Initiative on Northeast and Mid-Atlantic States," https://www.analysisgroup.com/Insights/cases/the-economic-impacts-of-the-regional-greenhouse-gas-initiative-on-northeast-and-mid-atlantic-states/.

A recent report from the Acadia Center, a nonprofit organization committed to advancing the clean energy future, entitled "The Regional Greenhouse Gas Initiative: Ten Years in Review," shows that CO_2 emissions from power plants in the participating states have decreased 47%, which is 90% faster than in the rest of country. The participating states were able to achieve that significant reduction while the GDP grew by 47%, outpacing the rest of the country by 31%.

RGGI has also driven substantial reductions in harmful co-pollutants, making the region's air cleaner and its people healthier. Additionally, proceeds from RGGI auctions generated nearly $3.3 billion in state investments from 2009 to 2019. See Acadia Center, "The Regional Greenhouse Gas Initiative 10 Years in Review," 2019, https://acadiacenter.org/wp-content/uploads/2019/09/Acadia-Center_RGGI_10-Years-in-Review_2019-09-17.pdf.

For comparison, according to the Department's 2020 GHG Inventory Report from 2005 to 2016, this Commonwealth reduced its net emissions by 33.5% while the participating states reduced CO_2 pollution from covered sources by over 45% over the same period. Additionally, this reduction was achieved while the region's per-capita GDP has continued to grow, highlighting the synergies between environmental protection and economic development.

Additionally, this final-form rulemaking may create economic opportunities for clean energy businesses. By establishing a cost for emitting CO_2, and pricing this externality into the energy market, the CO_2 Budget Trading Program will provide a market incentive for developing and deploying technologies that improve the fuel efficiency of electric generation, generate electricity from non-carbon emitting resources, reduce CO_2 emissions from combustion sources and encourage carbon capture and sequestration. The energy efficiency sector is the largest component of all energy jobs in this Commonwealth and the renewable energy sector contains some of the fastest growing jobs in the country.

Consideration of other alternatives

Beyond comparison to traditional command and control, the Department considered this final-form rulemaking in relation to other alternatives, including continuing to allow EGUs to emit CO_2 emissions unabated as well as designing this final-form rulemaking in which affected facilities are given allowances instead of having to purchase them. First, the status quo will not achieve the emissions reductions needed to protect public health and the environment, nor are current measures adequate to address climate change. The Department's modeling effort as mentioned above included two separate modeling tracks, the first of which is (a) the reference case which reflects business-as-usual with no regulatory or policy changes, and (b) the policy case which is reflective of the impacts of this final-form rulemaking. In comparing these modeling scenarios, without this final-form regulation, Pennsylvanians will experience between 97-227 million more tons of CO_2 than with this regulation. Additionally, residents of this Commonwealth will not benefit from improved air quality or realize the economic, job impacts or health benefits that result from this final-form regulation.

Furthermore, rather than benefitting from implementation of this final-form regulation- there will be a deleterious impact on the environment, health and the economy without this meaningful and decisive action. Business-as-usual or status quo does not address climate change in a meaningful way. While there may be emissions reductions in the future, they do not occur at the rate or level at which is required to avoid the worst impacts of climate change. Additionally, as a Commonwealth we will not be capable of honoring our commitment to address climate change and will fall short of meeting the interim 2025 greenhouse gas reduction goal for Pennsylvania.

In consideration of giving allowances to affected facilities instead of facilities needing to purchase them, that would also not be as effective as this final-form rulemaking. If this final-form rulemaking is not compatible with the RGGI program, it will be less effective at reducing CO_2 emissions in a cost-effective manner. Part of what makes RGGI economically efficient is that it is a regional program, allowing for EGUs to achieve least cost compliance by buying and selling CO_2 allowances whether in multistate auctions or in the secondary market. CO_2 allowances are fungible, meaning that though this Commonwealth has an established CO_2 allowance budget for each year, this Commonwealth's CO_2 allowances are available to meet the compliance obligations in any other participating state and vice versa. Therefore, emissions from this Commonwealth's power sector are not limited to strictly the amount of this Commonwealth's CO_2 allowances. This cooperation allows EGUs more flexibility in terms of compliance and allows the market to signal entrance and exit of generation. In this respect, the market assists in achieving least cost compliance for all participating states. Furthermore, strategic investments of the auction proceeds within this Commonwealth reduce GHG emissions even further than this Commonwealth's annual CO_2 allowance budget alone. Lastly, if those strategic investments are made in energy efficiency, ratepayers in this Commonwealth could experience cost savings by 2030 compared to not implementing this final-form rulemaking.

Pennsylvania-run CO_2 Allowance Auction Alternative

This final-form rulemaking includes a provision for the Department to participate in multistate CO_2 allowance auctions in coordination with other participating states based on specific conditions. First, a multistate auction capability and process must be in place for the participating states. A multistate auction must also provide benefits to this Commonwealth that meet or exceed the benefits conferred on this Commonwealth through a Pennsylvania-run auction process. The criteria that the Department will use to determine if the multistate auction "meets or exceeds the benefits" of a Pennsylvania-run auction are whether the auction results in reduced emissions and environmental, public health and welfare, and economic benefits. As discussed in this final-form rulemaking, participation in RGGI would provide those benefits to this Commonwealth. Additionally, the multistate auction process must be consistent with the process described in this final-form rulemaking and include monitoring of each CO_2 allowance auction by an independent market monitor. Since the multistate auctions conducted by RGGI, Inc. satisfy all four of the conditions, the Department will participate in the multistate auctions. However, if the Department finds these four conditions are no longer met, the Department may determine to conduct a Pennsylvania-run auction. By including the ability to conduct a Pennsylvania-run action in this final-form rulemaking, the Department provides for flexibility in case the benefits of the multistate auctions diminish in the future.

(27) In conducting a regulatory flexibility analysis, explain whether regulatory methods were considered that will minimize any adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), including:

a) The establishment of less stringent compliance or reporting requirements for small businesses.

Less stringent compliance and reporting requirements are not established under this final-form rulemaking. However, this final-form rulemaking includes a waste-coal set aside provision to assist waste coal-fired facilities with compliance by providing up to 10.4 million CO_2 allowances. The Department has estimated that 8 waste coal-fired facilities are small businesses. The Department has also established a small business assistance program that is available to provide confidential assistance to small businesses.

b) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses.

Establishment of a less stringent compliance schedule or deadline for small businesses is not possible. The compliance schedules and deadlines in this final-form rulemaking align with the regulations in the participating states and follow a 3-year control period for compliance. The Department has established a small business assistance program that is available to provide confidential assistance to the small businesses.

c) The consolidation or simplification of compliance or reporting requirements for small businesses.

Compliance and reporting requirements are the same for all affected facilities. The Department has established a small business assistance program that is available to provide confidential assistance to the small businesses.

d) The establishment of performance standards for small businesses to replace design or operational standards required in the regulation.

This final-form rulemaking does not include performance standards for any regulated facilities.

e) The exemption of small businesses from all or any part of the requirements contained in the regulation.

This final-form rulemaking does not exempt owners or operators of small businesses.

(28) If data is the basis for this regulation, please provide a description of the data, explain <u>in detail</u> how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

The data supporting the Department's IPM and REMI analysis can be found on the Department's website at https://www.dep.pa.gov/Citizens/climate/Pages/RGGI.aspx. A presentation entitled "Modeling Results Presentation" located on that webpage provides supplemental information about the modeling. Additionally, relevant data files are located on that webpage, labeled as "Reference Case Results" and "Policy Case Results."

The data supporting this Commonwealth's GHG emissions can be found on the Department's website at https://www.dep.pa.gov/Citizens/climate/Pages/GHG-Inventory.aspx.

Data supporting comparisons amongst states in CO_2 emissions can be found at https://www.eia.gov/. Data supporting GHG equivalencies can be found using https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

(29) Include a schedule for review of the regulation including:

A. The length of the public comment period:	69 days
B. The date or dates on which any public meetings or hearings were held:	December 8, 9, 10, 11 and 14, 2020
C. The expected date of delivery of the final-form regulation:	Quarter 3, 2021
D. The expected effective date of the final-form regulation:	Upon publication in the *Pennsylvania Bulletin*
E. The expected date by which compliance with the final-form regulation will be required:	January 1, 2022
F. The expected date by which required permits, licenses or other approvals must be obtained:	1 year after the effective date

(30) Describe the plan developed for evaluating the continuing effectiveness of the regulations after its implementation.

The Board is not establishing a sunset date for this final-form rulemaking, since it is needed for the Department to carry out its statutory authority. The Department will closely monitor this final-form rulemaking after promulgation as a final-form rulemaking in the *Pennsylvania Bulletin* for its effectiveness and recommend updates to the Board as necessary.

Through RGGI, Inc., the Department will utilize the expertise of an independent market monitor to monitor the multistate auctions, CO_2 allowance holdings and CO_2 allowance transactions, among other activities in order to ensure this final-form rulemaking is maintaining its effectiveness. The market monitor provides independent expert monitoring of the competitive performance and efficiency of the RGGI allowance market. This includes identifying attempts to exercise market power, collude, or otherwise manipulate prices in the auction and the secondary market, making recommendations regarding proposed market rule changes to improve the efficiency of the market for CO_2 allowances, and assessing whether the auctions are administered in accordance with the noticed auction rules and procedures. The market monitor will monitor bidder behavior in each auction and report to the participating states any activities that may have a material impact on the efficiency and performance of the auction. The participating states, through RGGI, Inc., release a Market Monitor Report shortly after each multistate auction. The report includes aggregate information about the auction including the dispersion of projected demand, the dispersion of bids, and a summary of bid prices, showing the minimum, maximum, average and clearing price and the CO_2 allowances awarded.

Further, the participating states conduct comprehensive, periodic "program reviews" to consider program successes, impacts and design elements. In particular, during program review, participating states may revise the RGGI Model Rule, adjust the multistate auction process and develop new goals for the CO_2 Budget Trading Program. The program review also includes an extensive regional stakeholder process that engages the regulated community, environmental groups, consumer and industry advocates and other interested stakeholders.

The participating states have completed 3 program reviews since program implementation in 2009, and the next program review is scheduled to begin in late Summer/early Fall of 2021. In 2021, RGGI Inc. announced[75] that RGGI states will be publishing a preliminary Program Review Schedule in late summer of 2021. Included in this review will be listening sessions held throughout the fall 2021 and winter of 2021/2022 to solicit widespread feedback. Based on that input and feedback, RGGI states will develop program review objectives and embark upon policy deliberations and technical analyses in 2022. Upon implementation of this final-form rulemaking, this Commonwealth would participate in the periodic program reviews to ensure this final-form rulemaking is implemented effectively.

[75] RGGI States Look Ahead to Third Program Review, February 2, 2021 https://www.rggi.org/sites/default/files/Uploads/Program-Review/2-2-2021/Program_Review_Initial_Statement.pdf.