

# Draft 2016 Pennsylvania Greenhouse Gas Emission Inventory

Climate Change Advisory Committee

July 12, 2016

# Emission Inventory

- State Inventory Tool:
  - Made available on April 5, 2016
  - Updated all 11 modules with data through 2013.
  - Compiled supplemental data in April
    - Data on Natural Gas Transmission and Distribution
    - Data on Forest Fires
    - Data on Industrial Processes throughout the state

# Emission Inventory

- Question on the Landfill Gas To Energy (LFGTE) default data; it changed significantly from last year. (units are MMTCE CH<sub>4</sub>)

Default LFGTE Data	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
2016	0.65	0.65	0.65	0.46	0.46	0.55	0.67	0.95	1.17	1.59	0.48	0.48	0.48	0.48
2015	1.53	1.50	1.54	1.39	1.45	1.56	1.65	1.91	2.09	2.47	2.58	2.58	2.58	

Emails to EPA have been exchanged, but no resolution has been reached yet.

# First Draft

- The first draft of the inventory was completed on May 11, 2016.
- The first draft showed an overall increase in greenhouse gas emissions in Pennsylvania of approximately 9.8 MMTCO<sub>2</sub>e from 2012 to 2013.
- The largest increase occurred in the “Industrial” sector (8.3 MMTCO<sub>2</sub>e)

# Industrial Sector Increases

<b>Industrial GHG Emissions (MMTCO<sub>2</sub>e)</b>	<b>2012</b>	<b>2013</b>
Combustion of Fossil Fuels	43.23	49.35
Industrial Process	18.47	18.98
Coal Mining and Abandoned Coal Mines	9.10	10.63
Natural Gas and Oil Systems	10.54	10.69

# Industrial Fossil Fuel Combustion Increases

CO <sub>2</sub> From the Combustion of Fossil Fuel (Industrial - MMTCO <sub>2</sub> e)		
Fuel type	2012	2013
Coking Coal	12.383	15.072
Other Coal	3.67	3.641
Distillate Fuel	3.352	3.706
LPG	0.741	0.623
Lubricants	0.798	0.844
Motor Gasoline	0.699	0.721
Misc. Petro Products	0.136	0.168
Petroleum Coke	2.499	2.366
Still Gas	2.553	3.112
Natural Gas	15.296	17.592
<b>Total</b>	<b>42.128</b>	<b>47.845</b>

# Coal Mine Increases

<b>Coal Mine Emissions (MMTCO<sub>2</sub>e)</b>	<b>2012</b>	<b>2013</b>
Coal Mining	8.48	10.04
Abandoned Coal Mines	0.62	0.60
Vented	0.10	0.10
Sealed	0.35	0.34
Flooded	0.17	0.16

# Residential / Commercial Sector

<b>Residential</b>	<b>Emissions</b>	<b>Emissions</b>
Fuel Type	(MMTCO <sub>2</sub> e)	(MMTCO <sub>2</sub> e)
	<b>2012</b>	<b>2013</b>
Distillate Fuel	5.24	5.87
Kerosene	0.08	0.08
LPG	1.04	1.17
Natural Gas	10.92	12.57
<b>Total</b>	<b>17.28</b>	<b>19.69</b>
<b>Commercial</b>	<b>Emissions</b>	<b>Emissions</b>
Fuel Type	(MMTCO <sub>2</sub> e)	(MMTCO <sub>2</sub> e)
	2012	2013
Coal	0.33	0.31
Distillate Fuel	1.26	1.37
LPG	0.4	0.48
Natural Gas	7.02	7.91
<b>Total</b>	<b>9.01</b>	<b>10.07</b>



# Transportation / Electric Power Sector

<b>Transportation</b>	<b>Emissions</b>	<b>Emissions</b>
Fuel Type	(MMTCO <sub>2</sub> e)	(MMTCO <sub>2</sub> e)
	<b>2012</b>	<b>2013</b>
Distillate Fuel	16.33	15.96
Jet Fuel, Kerosene	3.35	3.00
Motor Gasoline	39.27	39.44
Residual Fuel	0.56	0.47
Natural Gas	2.07	2.28
<b>Total</b>	<b>61.58</b>	<b>61.15</b>
<b>Electric Power</b>	<b>Emissions</b>	<b>Emissions</b>
Fuel Type	(MMTCO <sub>2</sub> e)	(MMTCO <sub>2</sub> e)
	2012	2013
Coal	82.93	83.08
Distillate Fuel	0.21	0.24
Petroleum Coke	0.00	0.00
Residual Fuel	0.05	0.05
Natural Gas	21.57	20.04
<b>Total</b>	<b>104.76</b>	<b>103.41</b>

# Solid Waste Sector

<b>CH<sub>4</sub> Emissions from Landfills (MMTCO<sub>2</sub>e)</b>	<b>2012</b>	<b>2013</b>
Potential CH <sub>4</sub>	10.22	10.43
MSW Generation	<b>9.55</b>	<b>9.75</b>
Industrial Generation	0.67	0.68
CH <sub>4</sub> Avoided	-2.21	-2.21
Flare	-0.44	-0.44
Landfill Gas-to-Energy	-1.77	-1.77
Oxidation at MSW Landfills	0.73	0.75
Oxidation at Industrial Landfills	0.07	0.07
<b>Total CH<sub>4</sub> Emissions</b>	<b>7.21</b>	<b>7.40</b>
<b>CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> Emissions for Waste Combustion (MMTCO<sub>2</sub>e)</b>		
CO <sub>2</sub>	2.28	2.28
Plastics	1.52	1.53
Synthetic Rubber in MSW	0.23	0.19
Synthetic Fibers	0.53	0.56
N <sub>2</sub> O	0.04	0.04
CH <sub>4</sub>	0.00	0.00
<b>Total CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub> Emissions</b>	<b>2.32</b>	<b>2.32</b>
<b>Total Waste Emissions</b>	<b>9.53</b>	<b>9.72</b>

# All Sectors – 1<sup>st</sup> Draft

Sector / Emission Source (MMTCO <sub>2</sub> e)	2012	2013	Change
<b>Residential</b>	<b>17.28</b>	<b>19.69</b>	<b>2.42</b>
<b>Commercial</b>	<b>9.07</b>	<b>10.11</b>	<b>1.04</b>
<b>Industrial</b>	<b>81.34</b>	<b>89.66</b>	<b>8.32</b>
Combustion of Fossil Fuels	43.23	49.35	6.12
Industrial Process	18.47	18.98	0.51
Coal Mining and Abandoned Coal Mines	9.10	10.63	1.54
Natural Gas and Oil Systems	10.54	10.69	0.15
<b>Transportation</b>	<b>62.74</b>	<b>62.26</b>	<b>-0.48</b>
Petroleum	60.66	59.98	-0.68
Natural Gas	2.07	2.28	0.20
<b>Electricity Production (in-state)</b>	<b>104.77</b>	<b>103.41</b>	<b>-1.36</b>
Coal	82.93	83.08	0.15
Natural Gas	21.57	20.04	-1.53
Oil	0.26	0.29	0.03
<b>Agriculture</b>	<b>7.40</b>	<b>7.12</b>	<b>-0.28</b>
Enteric Fermentation	3.52	3.45	-0.07
Manure Management	1.25	1.23	-0.02
Agricultural Soil Management	2.61	2.43	-0.19
Burning of Agricultural Crop Waste	0.01	0.01	0.00
<b>Waste Management</b>	<b>11.26</b>	<b>11.45</b>	<b>0.19</b>
Solid Waste and Combustion	9.53	9.72	0.19
Wastewater	1.73	1.73	0.00
<b>Total Statewide Gross Emissions (Prod)</b>	<b>293.85</b>	<b>303.70</b>	<b>9.85</b>
<i>Increase relative to 2000</i>	-9.01%	-5.69%	
<b>Forestry and Land Use</b>	<b>-34.31</b>	<b>-34.36</b>	<b>-0.05</b>
<b>Total Statewide Net Emissions (Prod. with sinks)</b>	<b>259.54</b>	<b>269.34</b>	<b>9.80</b>

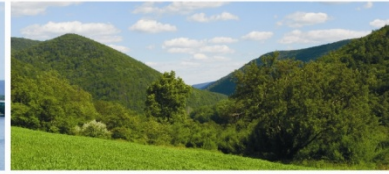


# Emission Inventory

- All numbers are for 1<sup>st</sup> draft of inventory.
- Numbers will be verified once LFGTE issue is resolved.
- Preliminary numbers show an increase of nearly 10 MMTCO<sub>2</sub>e between 2012 and 2013.



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Air Quality

# Thank You

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