2019 PHILADELPHIA GREENHOUSE GAS INVENTORY SUMMARY

This report summarizes the results of Philadelphia's 2019 Greenhouse Gas Inventory. The full report (including methodology) is available <u>here</u>.

The city-wide inventory covers emissions from sources within the City boundary for calendar year 2019 calculated using the <u>Global Protocol for Cities (GPC)</u>.



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2019 Greenhouse Gas (GHG) Inventory Highlights





Buildings and Industry contribute 69% of GHG emissions in Philadelphia²





Key Causes of Changes in Emissions (2006-2019)

Buildings & Industry

- Electricity generation from coal decreased from 45% in 2006 to 12% in 2019, resulting in a 40% decrease in emissions from electricity use.
- Philadelphia's refinery closed, reducing total 2019 emissions by 7%.

Transportation

- Cars and trucks in Philadelphia traveled 1.4 billion miles in 2019-23% more than in 2006.
- Emissions from rail (SEPTA and AMTRAK) decreased by 37%.

Waste & Wastewater

- Water and wastewater management improvements reduced emissions by 9%.
- · 34% reduction in tons of waste incinerated and sent to landfills.³

Other Sources

- Lower electricity transmission losses led to a 55% decrease in associated emissions.
- The airport served 4% more travelers and over 7% more cargo. Emissions increased by 3%.
- Tree canopy decreased by a net 6%.

1. GHG emissions in million metric tons of CO, equivalent.

3. Does not include waste hauled by private handlers to out-of-state facilities, as information is not available.

Philadelphians emitted less GHG per capita in 2019 than they did in 2006.

13 MTCO, e per capita in 2019 24% reduction since 2006

78,804 MTCO, e sequestered by Philadelphia's

tree canopy in 2019.

Electricity and gas

use and emissions in



Electricity Gas Steam Other Fuel

Emissions from electricity declined by 40% since 2006. Emissions from gas increased by 4%.



^{2.} Excluding roughly 5.3 MMTCO, e of emissions referred to as Basic+ and Scope 3. These emissions are included in the 20.5 MMTCO, e total and are listed as "Other." "Other" includes aviation, industrial gases (refrigerants and insulators), and changes in tree cover.

Introduction

The City of Philadelphia is committed to equitable action on climate change through reducing greenhouse gas (GHG) emissions and building climate resilience. Philadelphia's climate goals include achieving carbon neutrality by 2050. In order to track progress towards these goals, the City prepared a city-wide GHG inventory for 2019. This summary highlights key takeaways from the inventory. Philadelphia's path to carbon neutrality has a strong foundation thanks to the city's dense urban development and land use patterns, well-developed public transit system, walkability, biking infrastructure, and the initiatives that Philadelphia has implemented to reduce emissions.

Coal used to produce electricity decreased from 45% in 2005 to 12% in 2019. This led to lower emissions in 2019. Transition from other fossil fuels to renewable energy is needed to further reduce emissions and meet climate goals.



Philadelphia At A Glance

	2019	2006	Change				
Population							
	1,584,064	1,504,950	5.3% 🕇				
Employment							
- o -	790,653	711,418	11.1% 🕇				
Heating Degree Days							
∬ ₩	4331 °F	3972 °F	9.0% 🕇				
Cooling Degree Days							
Û.Ģ.	1477 °F	1234°F	19.7% 🕇				

GHG emissions are affected by social, economic, institutional, and environmental factors. Changes in population, employment, and heating and cooling demands can all influence year-to-year variation in GHG emissions. Philadelphia's heating and cooling demand, population, and employment were all higher in 2019 than in 2006 (baseline).

Philadelphia's emissions decreased despite these factors. Efforts in energy efficiency may have contributed to this success.

Reaching Philadelphia's 2050 net-zero emissions goal will require expansion of existing successful programs and the implementation of additional initiatives.

Buildings and Industry





Residential and Commercial & Industrial Subsector Emissions from Energy Use



The closure of the PES Refinery lowered 2019 emissions by nearly 1.5 MMTCO₂e as compared with 2006. Despite operating only for about half of 2019, the Refinery accounted for 7% of Philadelphia's total GHG emissions in 2019.



3,822 3,765

Commercial & Industrial

Electricity Use

Electricity Use 2006 2019

Residential

Per Capita Gas Use (MMBTU/Capita)		Per Capita Electricity Use (MWh/Capita)			
	Residential	Commercial & Industrial		Residential	Commercial & Industrial
2006	22.8	18.2	2006	2.5	6.2
2019	23.1	17.5	2019	2.4	5.8
% Change	1%🕇	-4%	% Change	-6%↓	-6% 🖡

10.000

9,000

8,000

7,000 6,000

4,000

3,000

2,000

1,000

0

4 5,000

1. Excluding approximately 0.2 MMTCO₂e of emissions referred to as Basic+ and Other Scope 3. These emissions are included in the 20.5 MMTCO₂e inventory total and in the charts shown on this page. The 0.2 MMTCO₂e includes emissions associated with losses of electricity in transmission and distribution.



Transportation



Vehicle use and vehicle emissions have increased since 2006, both in Philadelphia and nation-wide.

In Philadelphia, cars and trucks traveled for over 7.3 billion miles in 2019. This mileage constitutes a 23% increase from the 2006 baseline. The associated GHG emissions increased less (by 12%), likely due to vehicle efficiency improvements. In 2019, 57% of commuters drove to work, while 26% of city residents commuted via public transportation. There was a 37% decrease in passenger rail emissions (from SEPTA and Amtrak) since 2006. The regional electric grid emission reductions are the primary reason for this decrease in SEPTA and Amtrak emissions.

Encouraging growth in transit ridership can help reduce car use and overall transportation emissions.



The share of commuters who bike to work has increased since 2006, to over 2%.² In parts of the city, the share of bike commuters is much higher. Philadelphia is also one of the most walkable cities in the country.³ In 2019, 8.5% of commuters walked to work.



1. Excluding approximately 4.2 MMTCO₂e of emissions referred to as Basic+ and Other Scope 3. These emissions are included in the 20.5 MMTCO₂e inventory total and in the charts shown on this page. The 4.2 includes emissions associated with aviation and freight rail activity beyond the City's boundaries. **5** 2. Source: American Community Survey B08301, Means of Transportation to Work, 2019, 1-year estimate

3. <u>https://www.walkscore.com/cities-and-neighborhoods/</u>

Waste and Wastewater







In 2019, Philadelphia disposed of more than 1.4 million tons of solid waste. Roughly 63% of that waste was sent to landfills, while the remaining 37% was incinerated in waste-to-energy facilities.



Philadelphia residents recycled 2.6 times more waste in 2018 than they did in 2007, while recycling in the commercial sector increased by around 5%.²



180.000 160,000 140,000 120.000 75,622 MTCO₂e 100,000 131,254 80,000 60,000 42,832 40,000 3,068 20,000 29,749 0 2006 2019

Wastewater Treatment Emissions

Process Emissions Gas and Other Fuels Electricity

Wastewater emissions dropped between 2006 and 2019. One reason for the decrease is the beneficial use of biogas generated at the Northeast Water Pollution Control Plant to produce electricity and provide energy for the wastewater treatment process. Process emissions decreased by 9%. In 2019, the facility produced more than 27,000 megawatt hours (MWh) of electricity from biogas.

City of Philadelphia, Municipal Waste Management Plan, 2020 (2018 data). <u>https://www.phila.gov/documents/municipal-waste-management-plan/</u>
 GHG emissions in metric tons of CO₂ equivalent, MTCO₂e.

^{1.} The emissions reported for wastewater treatment also include emissions associated with drinking water management and delivery.

Other Sources



Other emission sources accounted for in the inventory include aviation,¹ freight rail,¹ electricity losses, greenhouse gasses used for refrigeration, insulation, and other industrial purposes, as well as changes to tree canopy.



Spotlight on Tree Canopy

17,356 acres of tree canopy in Philadelphia³
0.78 MMTCO₂e sequestered in 2019

0.44 MMTCO₂e net 2019 benefit from trees

20% of Philadelphia's land area had tree canopy in 2018

6% net loss in tree canopy (2008 to 2018)² Most of the canopy loss was on residential land²



Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and sulfur hexafluoride (SF $_{6}$) are potent greenhouse gases that accounted for 0.84 MMTCO $_{2}$ e of Philadelphia's 2019 GHG inventory.

A mature tree can sequester more than 48 pounds of carbon dioxide annually. Trees also help manage stormwater and play a key role in climate action.

Philadelphia's goal is to reach 30% tree cover, with a focus on low-income communities.

1. Freight rail and aviation are also summarized on page 5, "Transportation". Emissions outside of Philadelphia are reported under "Scope 3" and Basic+.

2. Due to rounding, emissions from subsectors reported here sum up to less than 5.3 $\rm MMTCO_2 e.$

3. Tree Canopy Assessment: https://treephilly.org/wp-content/uploads/2019/12/Tree-Canopy-Assessment-Report-Philadelphia-2018.pdf

Conclusion

Philadelphia achieved a 20% reduction in GHG emissions from 2006 to 2019. The main reasons for the reduction include:

- Decrease in coal use in the region's electricity generation
- Closure of Philadelphia's refinery
- Building energy efficiency improvements
- Transit emission reductions
- Decrease in waste and wastewater emissions

Sustainability projects that did not directly lead to emissions decreases helped to counter increases that otherwise would have occurred. For example, **improvements to bike infrastructure led to increases in bike commutes to work**, which offset some of the growth in the use of cars and associated emissions.

Reaching net zero emissions will require the expansion of current programs as well as additional efforts. Greenhouse gasses will be tracked and reported regularly following the same protocol used for the 2019 report. Climate action can provide the opportunity to reach GHG reduction goals while increasing social equity, creating jobs, and improving infrastructure. Net zero can only be achieved through ambitious and bold climate action, and Philadelphia intends to pursue this in a way that prioritizes the communities most burdened by pollution, most burdened by energy and transportation costs, as well as the communities most vulnerable to climate change, while benefiting the future wellbeing of all citizens.

PHILADELPHIA OFFICE OF SUSTAINABILITY

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