

MEMORANDUM

GHG Inventory



TO: City of Portland
FROM: Competitive Energy Services
DATE: April 20, 2018
RE: 2016 Greenhouse Gas Inventory

City of Portland 2016 Greenhouse Gas Inventory

In late 2017, Competitive Energy Services (CES) was contracted by the City of Portland to create an inventory of Scope I and Scope II Greenhouse Gas emissions from municipal operations for the calendar year of 2016, as a benchmark to aid the City in understanding current emissions levels and planning future reductions goals.

Methodology

Scope I

For the purposes of this inventory, CES obtained relevant available data from the City and the City's energy providers. Scope 1 emissions categories included stationary onsite fuel combustion, city-owned vehicle fuel combustion, fugitive refrigerant emission, and fertilizer use on City property. Stationary onsite fuel combustion includes the usage of natural gas and heating oil. CES obtained natural gas usage for the City's 44 natural gas accounts through usage requests to Unitil, the local distribution company. CES obtained heating oil usage, including both #2 oil and kerosene, from Fieldings Oil, the past and current heating oil supplier to the city. EPA emissions factors for carbon dioxide, methane, and nitrous oxide were used for all heating fuels.

For the remainder of Scope 1 emissions, City staff provided CES with 2016 recorded usage. Fleet combustion of gasoline and diesel and refrigerant use by fleet vehicles were provided by the Fleet Manager, and fertilizer usages were provided by Riverside Golf Course and the Department of Parks and Recreation. EPA emission factors for carbon dioxide, nitrous oxide, and methane were used for fleet fuels diesel and gasoline. The IPCC global warming potential factor for HFC-134a refrigerant, and Clean Air Cool Planet Carbon Calculator nitrogen emissions factors were used for fertilizers.

Scope II

The only applicable Scope II emissions source for the City is purchased electricity. CES obtained 2016 electricity usage for 334 accounts from Central Maine Power. Recently released EPA eGrid 2016 Maine emissions factors for carbon dioxide, nitrous oxide, and methane were used to calculate emissions.

Results

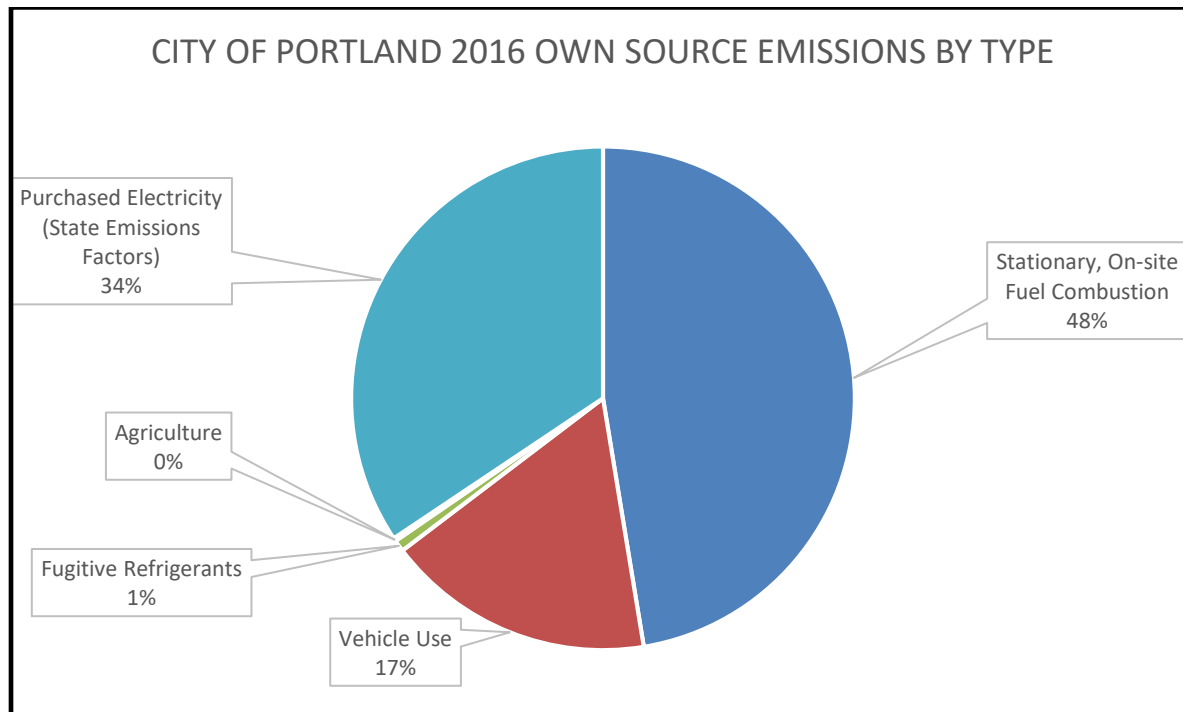
CES calculated total calendar 2016 emissions at 17,229 metric tons of carbon dioxide equivalent (MTCO_{2e}). 66%, or 11,305 MTCO_{2e}, came from Scope I sources. Of these Scope I sources, 8,168 MTCO_{2e} came from stationary onsite fuel combustion, 2,974 came from City vehicle use, 129 came from fugitive refrigerants, and

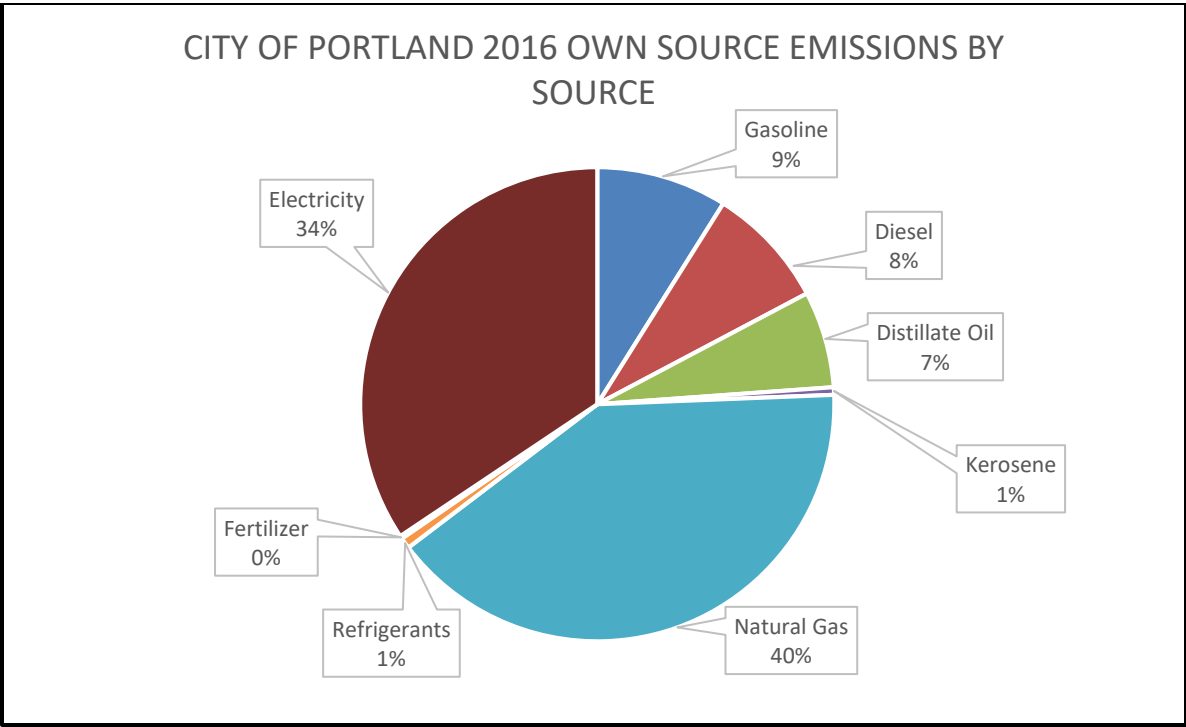
34 came from fertilizer usage. The remaining 5,925 MTCO_{2e} came from the Scope II source purchased electricity. The contributions of the different sources may be seen in detail in the tables and chart below.

SCOPE 1	CO _{2e}	CO ₂	N ₂ O	CH ₄	HFCs	UNIT
Stationary, On-site Fuel Combustion	8,168	8,157	0.0226	0.1799		metric tons
Vehicle Use	2,974	2,958	0.0314	0.2711		metric tons
Fugitive Refrigerants	129				0.08	metric tons
Agriculture (only N ₂ O applies)	34		0.1142			metric tons
SCOPE 1 TOTAL	11,305	11,115	0.17	0.45	0.08	metric tons

SCOPE 2	CO _{2e}	CO ₂	N ₂ O	CH ₄	HFCs	UNIT
Purchased Electricity (State Emissions Factors)	5,925	5,738	0.3917	2.7928		metric tons
SCOPE 2 TOTAL	5,925	5,738	0.39	2.79	0.00	metric tons
2016 OWN SOURCE EMISSIONS TOTAL	17,229	16,853	0.56	3.24	0.08	metric tons

SOURCE	USAGE UNIT	USAGE	mTons CO _{2e}
Gasoline	(gallons)	174,294	1,537
Diesel	(gallons)	139,805	1,436
Distillate Oil	(MMBtu)	15,300	1,136
Kerosene	(MMBtu)	1,174	89
Natural Gas	(MMBtu)	130,830	6,944
Refrigerants	(lbs)	180	129
Fertilizer	(lbs)	82,200	34
Electricity	(MWh)	37,543	5,925





Comparison to 2005

The City previously had community and municipal inventories prepared for 2005. The municipal inventory did differ in scope than this 2016 inventory, as the 2016 inventory only included Scope 1 and 2 own source emissions, while the 2005 inventory included emissions from waste and wastewater, both of which are Scope 3 indirect emissions. Additionally, there were some differences in the data collected between the two years. Refrigerants and fertilizers were collected in 2016 but not 2005. In 2005, liquid heating fuels included #6 and #4 residual oils, #2 distillate oil, kerosene, and propane. In 2016, liquid heating fuels included only #2 distillate oil and kerosene.

Excluding waste and wastewater, 2016 emissions were 34% lower than in 2005. The largest contributor to this reduction is the conversion from different types of heating oil to natural gas on many City properties, where emissions dropped 35%. Distillate and residual oils usage totaled 152,974 MMBtu and 11,405 MTCO_{2e} CO_{2e} in 2005 compared to 15,300 MMBtu and 1,136 MTCO_{2e} in 2016, while natural gas totaled 21,647 MMBtu and 1,149 MTCO_{2e} in 2005 and 130,830 MMBtu and 6,944 MTCO_{2e} in 2016.

It should be noted that 2005 was colder than 2016, with 10% more heating degree days, which likely contributed in part to a 16% decrease in MMBtu of total heating fuel usage in 2016. Basic efficiency upgrades have likely played a role as well, though those measures have not quantified for this report.

Electricity usage was 27% lower in 2005 than 2016, but due to the increasing role of renewables and gas and the retirement of coal and oil in power generation in Maine, emissions due to electricity usage decreased 37% between 2005 and 2016.

Fleet usage decreased for both fuels, particularly diesel, which decreased in usage by 66% and emissions by 40%. Gasoline decreased by 12% in usage and 11% in emissions. Side by side comparison for all sources can be seen in the chart below.

