

Providence Citywide GHG Inventory – 2018

This report documents the City of Providence’s 2018 Citywide Greenhouse Gas (GHG) Inventory including the underlying methodologies used and the updates made to the 2015 baseline¹ inventory resulting from new and improved data. A detailed report of the methodology applied and updates made to the 2015 inventory is available upon request.

The Office of Sustainability used the most accurate and current information available for its inventory, but it is not a precise measurement. The methodology applied adheres to the [Global Protocol for Community-Scale Greenhouse Gas Emissions](#) and has been submitted to and reviewed by the [Carbon Disclosure Project \(CDP\)](#).

Emissions Overview, 2015 and 2018

Table 1: Citywide Emissions (Metric Tons CO₂e)

2015 Baseline	2018	2015-2018 % Change (Overall)	% Change/Year
2,574,360	2,496,185	-3.04%	-1.01%

Citywide Emissions declined by 3.04% over the three-year span from 2015 to 2018, equating to an approximate average **1.01% reduction per year** (see Table 1). If Providence were to maintain this level of change, it would not meet its 2050 Carbon neutrality goal until at least 2113. In order to meet the goal by 2050, Providence’s rate of decarbonization must triple.

Figure 1 shows Providence’s 2015 and 2018 emissions. The orange line shows yearly emissions if the City continues decarbonizing at its current rate. The blue dotted line shows the accelerated reduction needed (3.03%) to achieve neutrality by 2050

¹ Providence’s first GHG inventory was completed for the year 2015. As a result, 2015 is considered the City’s baseline year.

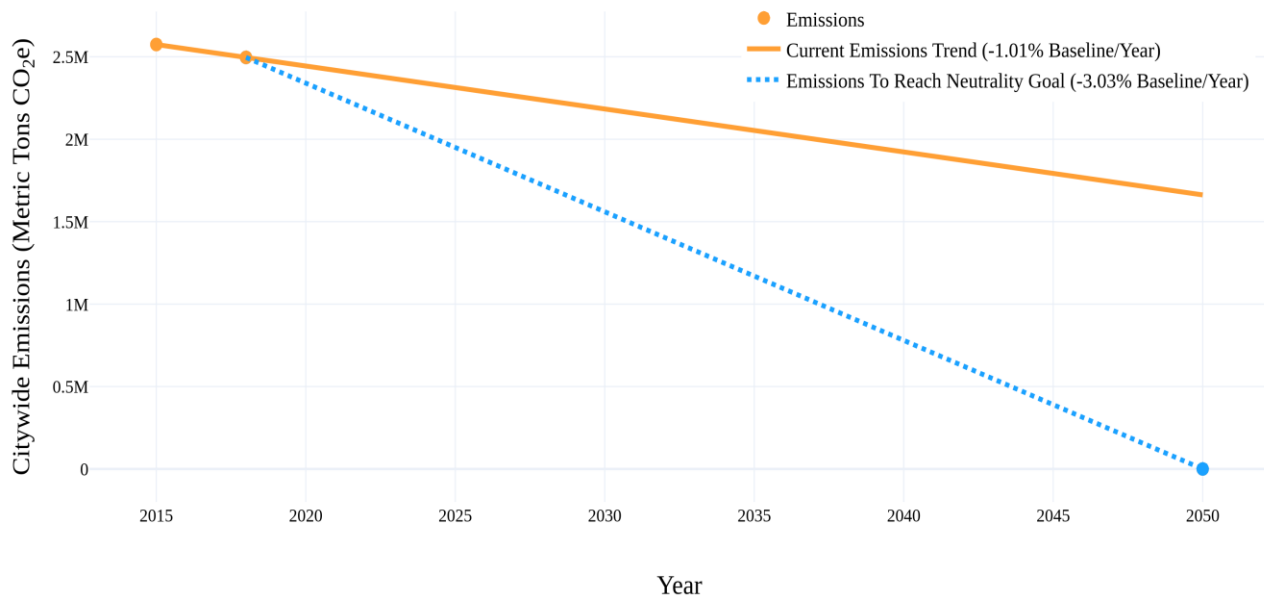
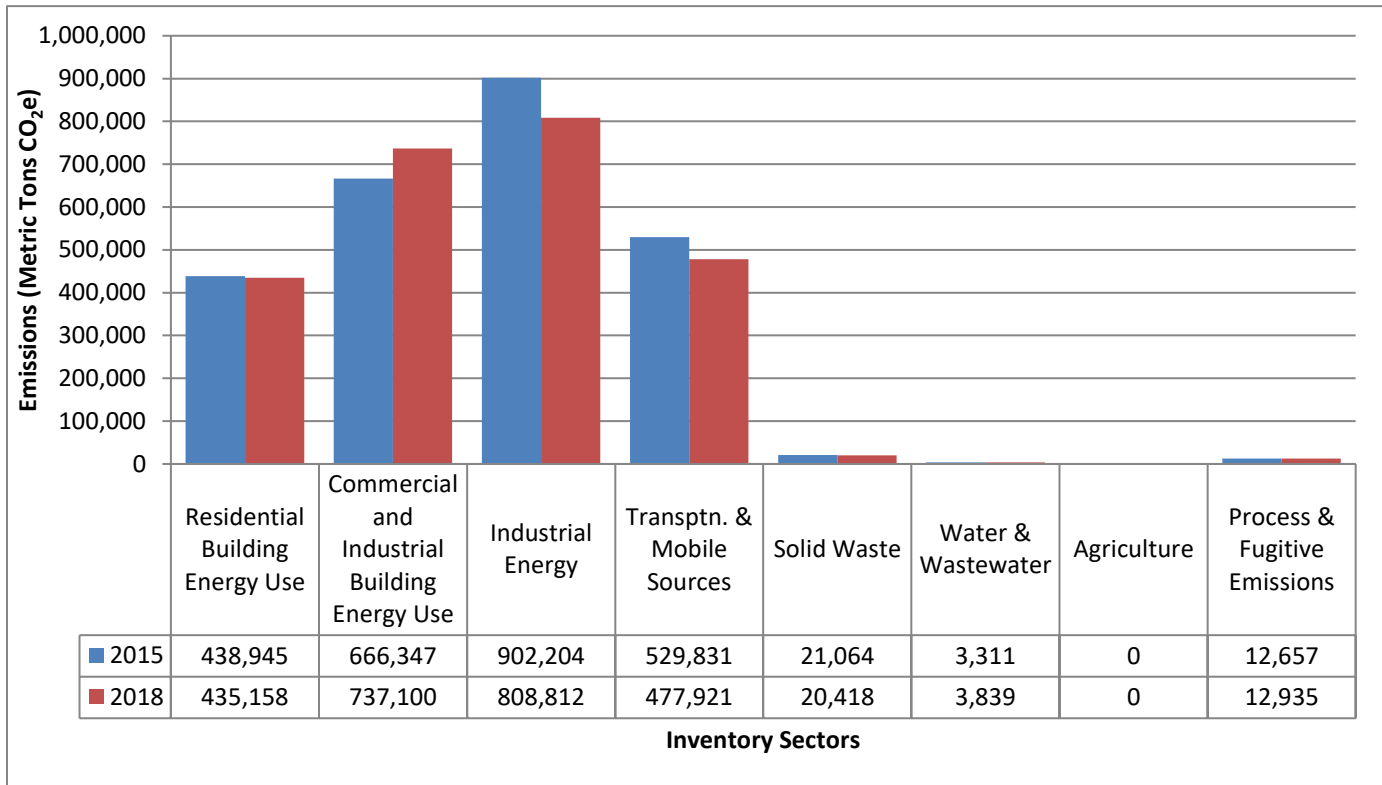


Figure 1: Providence's 2015 & 2018 Greenhouse Gas Emissions showing Business-as-Usual (BAU) compared to what is needed to reach City's goal of carbon neutrality by 2050

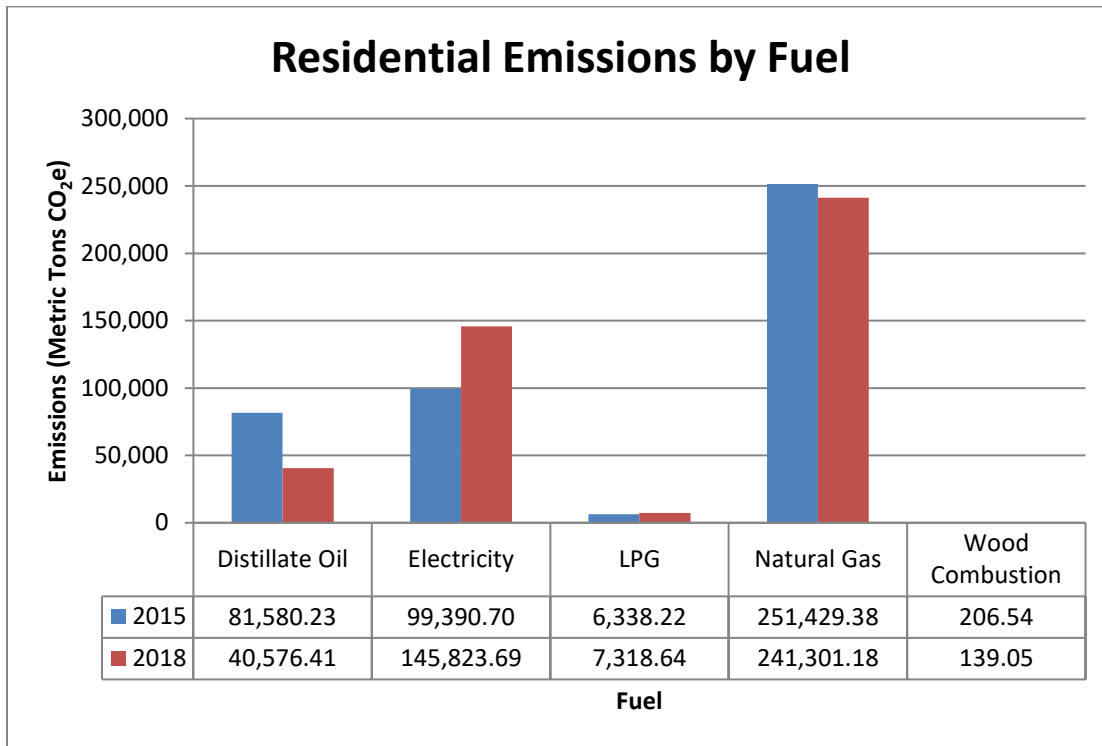
Emissions by Sector



Residential energy use, as well as solid waste and process and fugitive emissions, remained relatively flat between 2015 and 2018. Commercial and Industrial Building (C&I) energy use² increased, while both industrial and transportation energy consumption went down. The increase in C&I energy use is largely attributed to an increase in electricity use from C&I buildings. Industrial energy use has declined due to the reduction in generation at the Manchester Street Power Station. Industrial Energy emissions also include emissions produced at industrial facilities by the use of Distillate Fuel Oil, Residual Fuel Oil, LPG, and Gasoline. The decrease in Transportation and Mobile Source emissions is primarily attributable to a slight reduction in vehicle use from 2015 to 2018 as reported by RI DOT.

² Electricity and natural gas use by buildings in the Industrial Energy sector is included in the Commercial and Industrial Building Energy Use category. The Industrial Energy sector catalogues direct sources of emissions, such as Manchester Street Power Station.

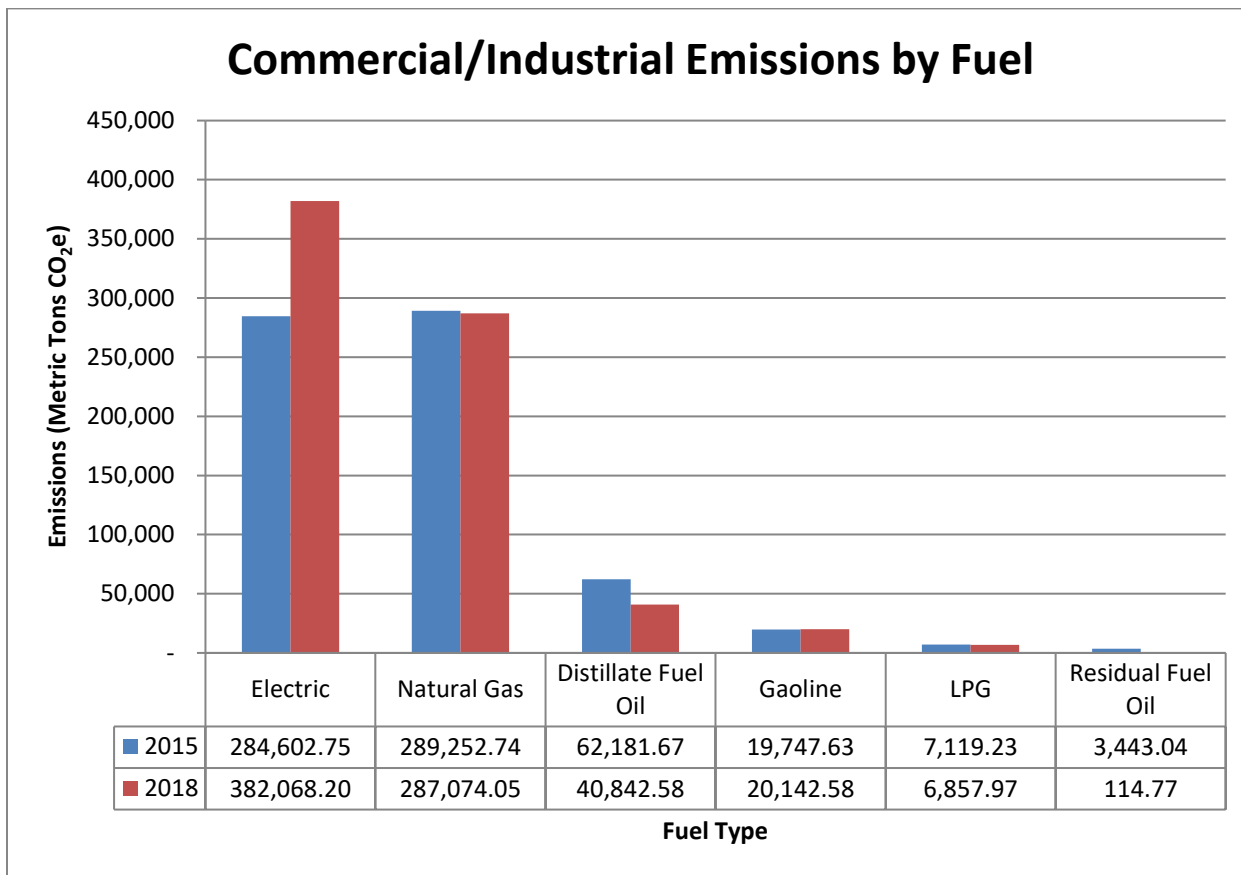
Residential Energy



Overall, emissions from residential energy use did not change drastically between 2015 and 2018, yet residents have increased their electricity use, while using less distillate oil and natural gas.

Electricity and natural gas use data is provided to the City by National Grid. Distillate Oil, LPG, and Wood Combustion emissions were calculated using data provided by the Energy Information Administration (EIA) State Energy Data System (SEDS).

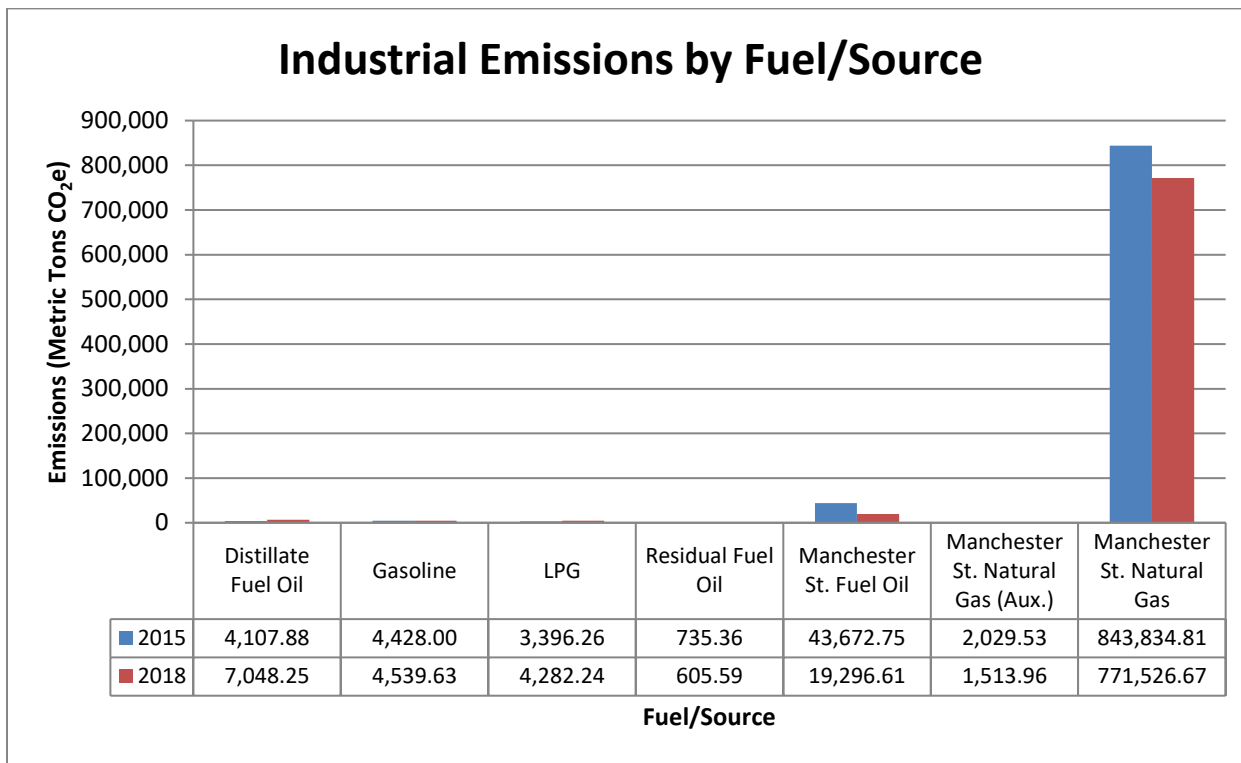
Commercial and Industrial Building Energy



Commercial and Industrial (C&I) Building electricity use also increased while natural gas use remained fairly constant, and distillate fuel oil use declined slightly. Use of residual fuel oil declined sharply.

As with residential energy use, C&I electricity and natural gas usage is reported in aggregate to the City by National Grid. Calculations for emissions of distillate fuel oil, gasoline, LPG, and residual fuel oil are sourced from Energy Information Administration (EIA) State Energy Data System (SEDS).

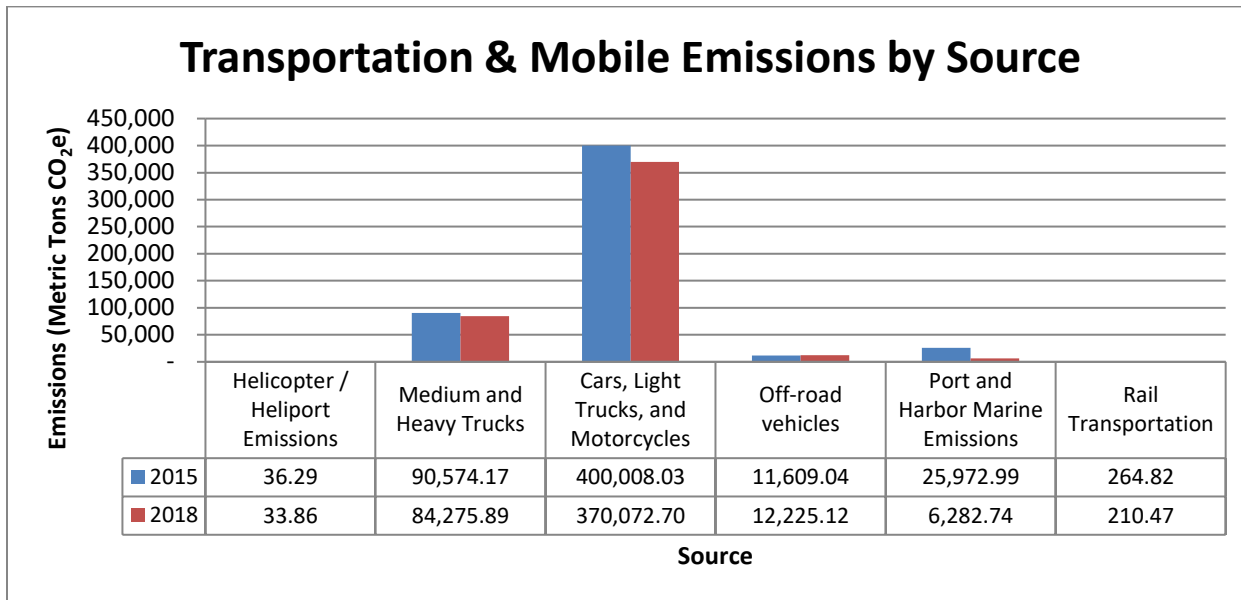
Industrial Direct Emissions



Industrial Direct Emissions from Manchester Street are reported via the EPA’s FLIGHT (Facility Level Information on GreenHouse gases Tool). Overall, the Manchester Street Power Station’s annual emissions decreased for inventory year 2018, indicating that the facility either reduced production, or the production process became more efficient/and or cleaner.

The other figures, (distillate fuel oil, gasoline, LPG, and residual fuel oil) are calculated using data from the Energy Information Administration (EIA) State Energy Data System (SEDS).

Transportation & Mobile Sources

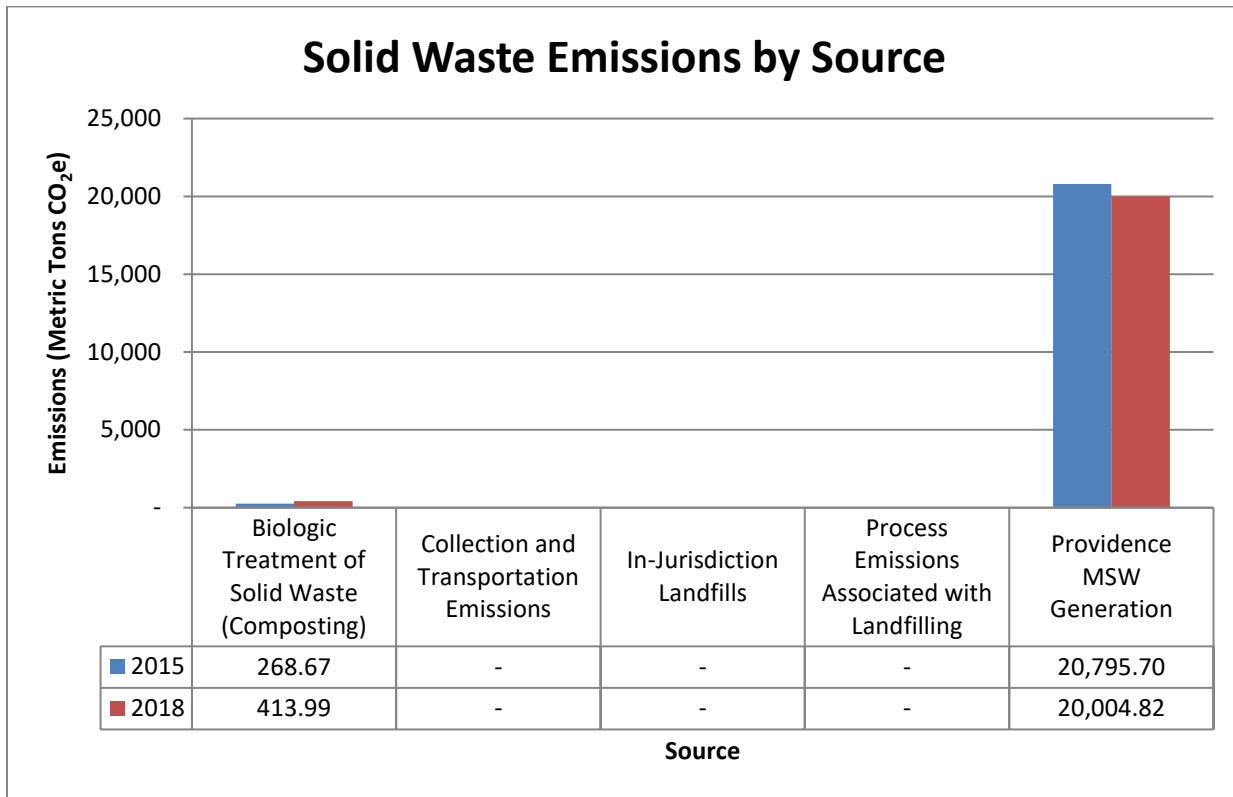


Transportation emissions for on-road vehicles are calculated using road usage data provided to the City by the Rhode Island Department of Transportation (RIDOT) and fuel efficiency data sourced by the EPA. RIDOT has provided state-specific breakdowns of the share of each vehicle type (heavy truck, motorcycle, etc.), and specific fuel source (diesel, gasoline, electric, etc.). However, an updated version of this information was not available for the 2018 Inventory, so the 2015 percentages are used again.

For the most part, a decrease in the recorded Vehicle Miles Traveled (VMT) for within Providence City boundaries calendar year 2018 resulted in a lower emissions estimation compared to 2015. Average efficiency of vehicles has increased since 2015, but this factor is relatively minor compared to VMT.

Emissions from helicopters/heliports, off-road vehicles, ports, harbors, and rail transportation are calculated from emissions reported by the EPA in the National Emissions Inventory (NEI). These figures are reported by the EPA in tons of carbon monoxide, and adjusted to carbon dioxide based on reported activity use.

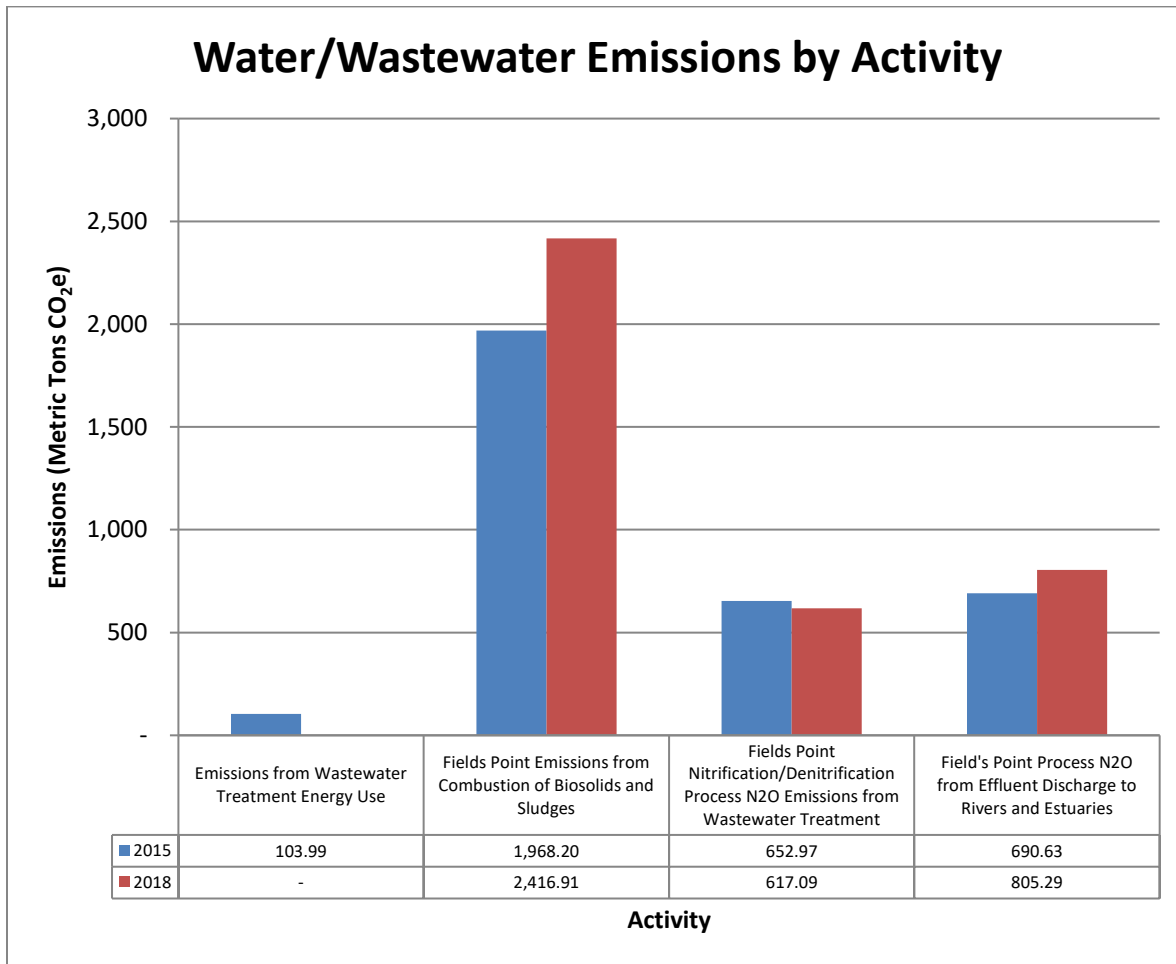
Solid Waste



Composting is reported to the City in tonnage by the Rhode Island Resource Recovery Corporation (RIRRC). Each year, the City collects data from private residential composting haulers on a voluntary basis to report to RIRRC. RIRRC combines this with Leaf & Yard Waste Collection and backyard composting bins sold from RIRRC to report back to the City. It does not include all organics collected and composted in the city. Municipal Solid Waste (MSW) is calculated using data also reported by RIRRC.

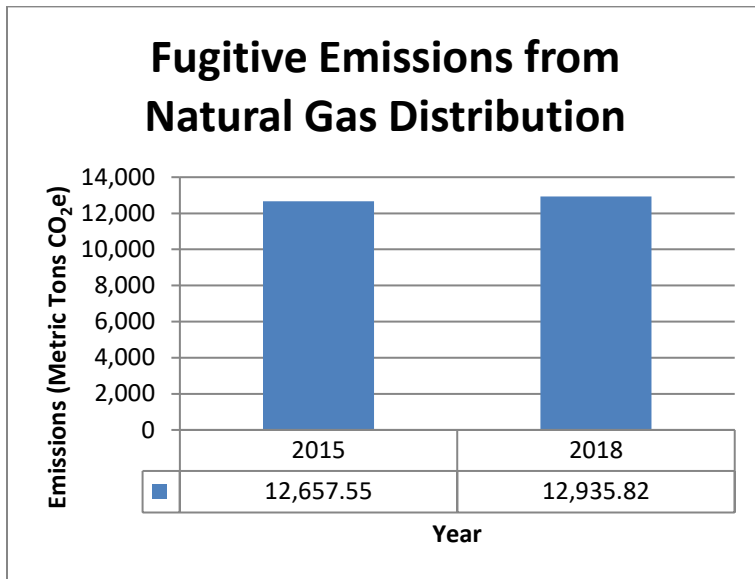
From 2015 to 2018, emissions from MSW slightly declined, while emissions from composting increased slightly, indicating that more waste was composted and less went into the landfill. The amount of compostable materials coming from Providence to RIRRC increased from 3486 tons in 2015 to 5526 tons in 2018.

Water and Waste Water



The data used in these calculations is reported to the City by the Narragansett Bay Commission.

Fugitive Emissions



Fugitive emissions are calculated based on the amount of natural gas that is estimated to have escaped the distribution network. The rate of escape for 2018 is assumed to be the same as 2015. Therefore the slight increase in fugitive emissions here is proportional to the slight increase in total natural gas use (residential and commercial/industrial) between those years. Based on the age of the distribution system, and studies done in other similar systems, the City recognizes this estimate could be artificially low³.

³ <https://www.bu.edu/energy/research/technologies-engineered-systems/methane-emissions/>;
<https://www.edf.org/climate/methanemaps/city-snapshots/boston>

Emissions by Scope

Scope	Emissions (Metric Tons CO ₂ e)			Percent Change
	2015	2018	Change	
Scope 1	2,167,328	1,945,450	-221,878	-10.24%
Scope 2	384,000	527,900	143,900	37.47%
Scope 3	23,032	22,835	-197	-0.86%

Activities taking place within a city can generate GHG emissions that occur inside the city boundary as well as outside the city boundary. To distinguish among them, the [Global Protocol for Community-Scale Greenhouse Gas Emission Inventories](#) groups emissions into three categories based on where they occur: scope 1, scope 2 or scope 3 emissions.

Scope 1: GHG emissions from sources located within the city boundary e.g. emissions from burning wood for a fire, emissions from a car's tailpipe.

Scope 2: GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary e.g. emissions related to electricity generation that is then used to power a household.

Scope 3: All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary e.g. the emissions generated from a flight taken by a Providence resident or business departing from T.F. Green airport in Warwick.

Reporting by scope of emissions helps standardize reporting procedures in order to get comparable results, however it reporting by scope does not necessarily paint an accurate picture of a City's total carbon footprint. The Global Covenant of Mayors requires cities to report on scope 1 and scope 2 emissions. Cities track scope 3 emissions as data becomes more available.

Since 2015, Providence's Scope 1 emissions have significantly decreased, while Scope 2 emissions have increased. Electricity is being consumed at an increased rate while direct emissions sources (Manchester Street Power Station, vehicle, etc.) have decreased. This shift towards electrification is important for Providence to meet its clean energy goals.