City of Corvallis

Organizational Greenhouse Gas Inventory Report for 2016

Overview

The Intergovernmental Panel on Climate Change (IPCC), the United Nations body that regularly convenes climate scientists, has identified human activity as the primary cause of the climate change. Consensus opinion states that greenhouse gas emissions from human activity must be significantly reduced to avoid the worst potential climate impacts.

In 2016, the Corvallis City Council acknowledged this research by adopting the Corvallis Climate Action Plan (CAP) with targets for reductions in greenhouse gas emissions in the Corvallis community. The CAP set a target to reduce greenhouse gas emissions 75% by 2050 (as compared with 1990 levels), which equates to approximately a 3.2% annual reduction.

The City Council requested staff conduct an organizational greenhouse gas inventory and report the data every other year to quantify the greenhouse gas emissions from City operations. By conducting inventories at regular intervals, the information can be used to understand trends and manage specific emissions sources and activities. The results of these inventories will identify areas for investigation and inform decision-making. Other instruments, such as the Sustainability Annual Report, will be used to communicate progress on projects associated with greenhouse gas emissions.

In 2014, as part of the Environmental Protection Agency's (EPA) Climate Showcase Communities grant, staff conducted an inventory for calendar year 2013. Throughout this document, comparisons will be made between the 2013 and 2016 inventories.

Methodology

This inventory, as well as the 2013 inventory, follow ICLEI's Local Government Operations Protocol for the quantification and reporting of greenhouse gas emissions, Version 1.1, dated May 2010. This protocol provides guidance in quantifying Scope 1 and Scope 2 emissions sources. A variety of other sources was used to estimate Scope 3 emissions sources (e.g. Natural Resources Canada's GHGenius v3.14, EPA's Waste Reduction Model (WARM), Economic Input-Output Life Cycle Assessment model).

All greenhouse gas emissions in this report are represented in metric tons of carbon dioxide equivalent (MT CO2e). Quantities of individual greenhouse gases (carbon dioxide, methane, nitrous oxide, chlorofluorocarbons (CFCs), perfluorinated compounds (PFCs), and sulfur hexafluoride) are not represented in this report.

Organizational Boundaries and Emission Scopes

One of the first steps in a greenhouse gas inventory is to determine the boundaries and scopes that will be included. The boundaries define what operations are to be included in the inventory. From the ICLEI Protocol, we have chosen to follow an Operational Control approach, which defines control as having the full ability to introduce and implement our operating policies at a location.

The Local Government Operations Protocol classifies emissions sources and activities as producing either direct or indirect greenhouse gas emissions. Some emissions sources, such as gasoline use, have a direct connection to City operations. Other sources, such as employee commutes, do not have a direct connection but are an important part of conducting our mission. In other words, our direct emissions are from sources owned or controlled by the City of Corvallis. Indirect emissions occur because of actions related to our work, but the direct source of emissions is controlled by a separate entity. These sources are classified into three emissions "Scopes," defined for greenhouse gas accounting and reporting purposes as:

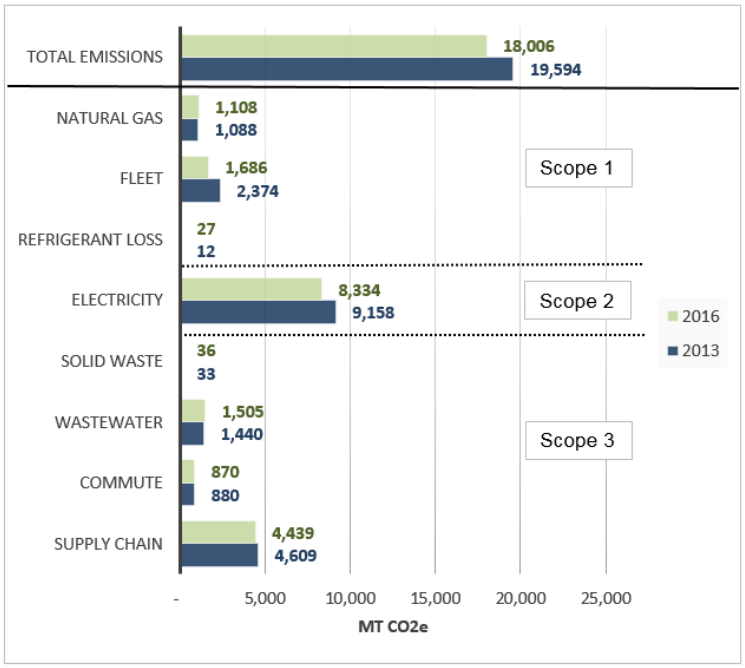
- Scope 1 – Direct sources of greenhouse gas emissions that originate from owned equipment and facilities such as combustion of fuels or loss of fugitive refrigerants.
- Scope 2 – Indirect emissions from purchased electricity and how the power is generated.
- Scope 3 – All other indirect sources of emissions that result from the institution's activities and choices, but are directly controlled by another party, such as employee commutes, air travel, solid waste disposal or supply chain.

Scope 1 (direct) and Scope 2 (indirect) emissions must be reported for most operational protocols and registries. Scope 3 emissions are considered optional when reporting emissions to a registry, but provide clarity to an organization's entire carbon footprint.

Results

Total greenhouse gas emissions from City of Corvallis operations for calendar year 2016 were 18,006 MT CO2e. That is 8.1% below 2013 emissions, or a 2.7% annual decline, slightly below the CAP target of a 3.2% annual decline. Figure 1 shows a comparison of emissions for years 2016 and 2013.

Figure 1: City of Corvallis Greenhouse Gas Emissions, comparison 2016 v. 2013



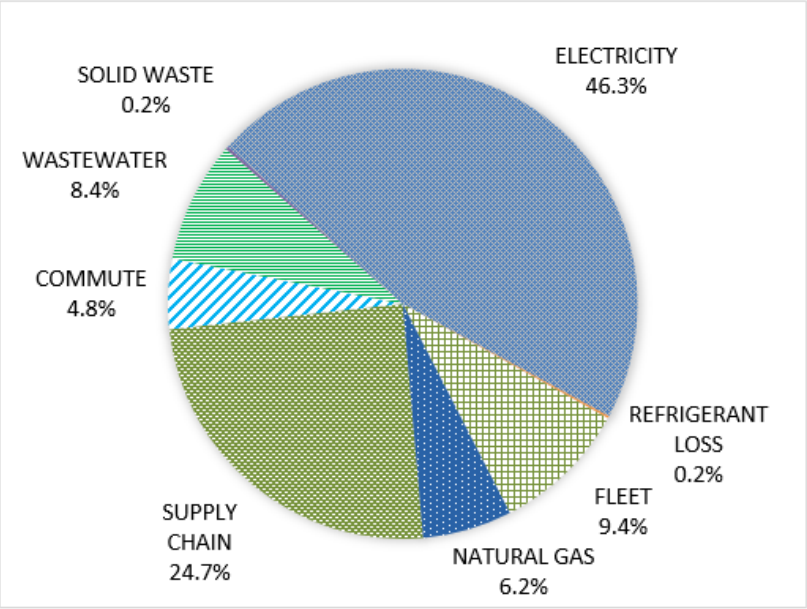
Electricity

Emissions from electricity use totaled 8,334 MT CO2e, or 46.3% of total emissions. Figure 2 shows the percentage of emissions generated by each category. Electricity use declined by 4.3% between 2013 and 2016, nearly 370,000 kWh. On-site solar generation increased from 0.4% to 2.6% of total kWh usage over the same time period. This is due to the addition of the 208 kWh array at Public Works installed in December 2014.

Upgrades to LED lighting at City Hall, the Library, Madison Avenue Building and the Osborn natatorium contributed to the reduction in kilowatt hours. Outside factors reducing emissions include a decrease in the percent of electricity lost as heat in transmission, or line loss, and a slight decrease in Pacific Power's emissions factor, which is a value that quantifies the level of a pollutant with an activity (in this case, the amount of CO2e per kWh of electricity).

Pacific Power provides 94% of the electricity used by the City and Consumer's Power provides the remaining 6%. Their emissions factors vary widely; Pacific Power's electricity generation emits 31 times more greenhouse gases per kilowatt hour than Consumer's Power.

Figure 2: Percentage Breakdown of 2016 Greenhouse Gas Emissions, by Category



Consumption of Goods and Services

Emissions from the City's consumption of goods and services were 4,439 MT CO2e, a 3.7% decline from 2013 emissions and 24.7% of total emissions.

Emissions were calculated using the Economic Input-Output Life Cycle Assessment (EIO-LCA) method, which estimates the materials and energy resources required for, and the environmental emissions resulting from, activities in our economy. Results from using the EIO-LCA tool provide guidance on the relative impacts of different types of products, materials, services, or industries with respect to resource use and emissions throughout the supply chain.

The decline in the City's emissions associated with the consumption of goods and services is related to shifts in spending away from high-emission categories, such as vehicles and materials and supplies used to complete tasks. These might include medical or safety supplies, books, furniture, and other operating supplies and equipment. This is not an indication that the City is purchasing fewer of these items; it simply means fewer dollars were spent in these categories in 2016 than 2013 (in relative dollars).

Fleet Fuel Use

Emissions from vehicle and equipment fuel use totaled 1,686 MT CO2e in 2016. This is a decline of nearly 29% since 2013, and comprises 9.4% of the City's total emissions.

The main reason for this significant decline in emissions is the shift from biodiesel (B-5) to renewable diesel fuels (R-50 and R-99). Renewable diesel, like biodiesel, is derived from waste agricultural products, particularly vegetable oils and animal fats. Renewable diesel differs from biodiesel in how it is processed, which causes it to burn much cleaner and create fewer

emissions. This progress has not been sustained, as activities at the State level required communities state-wide to suspend use of renewable diesel. Those requirements are expected to change in the future and renewable diesel will likely become available in Oregon again.

Total gallons used increased 21,000 since 2013, but due to the change in fuels, emissions were down by almost 700 MT CO2e. Gallons used for fleet increased by nearly 16% and for transit by almost 6%. However, if you compare to other years, 2013 was an especially low fuel usage year. For example, the increase between 2012 and 2016 was less than 3,000 gallons. Those fluctuations may be related to several factors, such as the weather, employee vacancies, or other conditions.

For all fuel types (unleaded gasoline, diesel, biodiesel), emissions are calculated using E3 Fleet's Emissions Calculator[1]. The calculator results are estimates, using emission factors and assumptions from Natural Resources Canada's GHGenius v3.14 model, and include the entire life-cycle of the fuels.

Wastewater Emissions

Wastewater treatment processes can include many different sources of greenhouse gas emissions. The methodology used focuses only on methane and nitrous oxide emissions created by the City's centralized wastewater treatment. The model used for calculation of wastewater emissions is driven by population. Our community saw an increase of nearly 3,000 residents since 2013. However, that increase was somewhat offset by a drop in the amount of digester gas, a byproduct of the wastewater treatment process, generated per person per day.

Total emissions in this category were 1,505 MT CO2e, or 8.4% of total emissions. This is a 4.5% increase since 2013.

Stationary Combustion

Total emissions for this category, which are generated by the use of natural gas, were 1,108 MT CO2e, or 6.2% of total emissions. This is an increase in total therms used from 204,000 in 2013 to 208,000 in 2016, a 1.9% increase. Majestic Theater, the only significant change in square footage under the City's operational control, accounted for less than 1% of the additional emissions.

Employee Commute

The City's 400+ employees generated 870 MT CO2e commuting to and from work in 2016. That amounted to 4.8% of total emissions. Emissions in this category declined by 1.1% since 2013, which had a similar size workforce. Although the average commute miles driven per person per day increased slightly, it was offset by an increase in the average fuel efficiency of the vehicles driven.

Solid Waste

Emissions from solid waste totaled 36 MT CO2e, which is 0.2% of total organizational emissions. Solid waste sent to the landfill decreased by 52 tons between 2013 and 2016, which decreased emissions by 16%. The higher tonnage in 2013 was due to a significant effort to

[1] https://www.e3fleet.com/emissions_calculator.html

clean storm drains (catch basins) in the City. Since then, storm drain maintenance has resumed a normal schedule and waste levels from this source have been consistent.

Public waste collected by the City, which is not included in this inventory, increased by 18%. Sources for these materials are the waste bins in City parks and downtown locations, and illegal camp cleanups.

Emissions were calculated using Good Company's G3C calculator, which is based on the EPA's Waste Reduction Model (WARM),

Refrigerant loss

Emissions from refrigerant loss amounted to 27 MT CO2e, or 0.2% of total emissions. These come from refrigerants escaping from air conditioning and refrigeration units in City buildings and air conditioning units in City vehicles. These refrigerants have global warming potentials that are hundreds or thousands of times that of carbon dioxide, so losing a little can add up quickly.

For the 2013 emissions inventory, the refrigerants used by the City for air conditioning purposes were R-22 and R-14a. These refrigerants were considered ozone-depleting substances and were being phased out under the Montreal Protocol, a global agreement to protect the ozone layer. Because of this, they were not classified as greenhouse gases under the Kyoto Protocol, an international treaty to reduce greenhouse gas emissions. The refrigerants used by the City in 2016, R-407C and R-410A, are classified as emitting greenhouse gases, both with significant Global Warming Potentials over 1,500. The total amounts used (22 lbs in 2013 vs 20.7 lbs in 2016) are not significantly different; but the classification change caused the increase in emissions.

For automotive refrigerants, data showing the amounts used in 2016 were unavailable from the provider, so the amounts and types used were estimated to be the same as 2013.

Next Steps

Information from this greenhouse gas emissions inventory and the insights gained from comparisons to the 2013 inventory will be used to inform the Strategic Operational Plan and help to prioritize and implement actions from the Corvallis Climate Action Plan.

Questions or information about sources can be directed to Scott Dybvad, Sustainability Program Specialist, at scott.dybvad@corvallisoregon.gov.