

MEMORANDUM

DATE: December 8, 2020

TO: Adrienne Hegedus, Port of Bellingham

FROM: Janice Gedlund, Cogent Environmental Consulting, LLC



SUBJECT: Results of Port of Bellingham's 2019 Greenhouse Gas Inventory

Introduction

Completion of the Port of Bellingham's 2019 greenhouse gas (GHG) inventory is a key milestone in developing a Climate Action Strategy for the Port.

Cogent Environmental assisted the Port of Bellingham in completing its 2019 GHG inventory. The work was broken into the following three subtasks:

- 1: Review draft GHG inventory and recommend improvements
- 2: As needed, assist Port in updating the inventory
- 3: Summarize results of final GHG inventory

Subtask 1 was completed in November 2020 via a memo documenting findings and recommendations. Subtask 2, completed in December 2020, involved developing an Excel workbook to document procedures and calculate the Port's 2019 GHG emissions. The Excel workbook can also be used as a template to create GHG inventories for other years. This memo documents completion of Subtask 3, covering results of the inventory, the methodology used, and limitations of the inventory.

2019 GHG inventory results

Per the Port's Roadmap to a Climate Action Plan, the 2019 GHG inventory quantified the Port's direct emissions as a top priority, as opposed to customer and downstream effects.¹ The Port's direct emissions come from Port-controlled fleet and buildings. The Port-controlled fleet includes vehicles, vessels, and equipment owned by the Port and operated by Port staff. Port-controlled buildings include portions of an airport, shipping terminal, harbor, marinas, administrative and maintenance facilities, and public access areas. (The inventory excludes energy used by Port tenants when tenant use was quantifiable by separate metering or submetering.)

In addition, the inventory also quantifies emissions from Port employee commuting, which is an indirect source of emissions, but one which the Port can influence.

¹ ECONorthwest. *Port of Bellingham Roadmap to a Climate Action Plan*. (December 2019).

Translating these emissions into the definitions used in standard GHG reporting protocols, the inventory covers the following sources:

Scope 1 emissions—sources under the direct control and operation of the Port. These include natural gas burned in Port-controlled buildings, fuel burned in the Port-owned fleet, and fugitive emissions from refrigerants used in Port-controlled buildings and vehicles.

Scope 2 emissions—indirect sources such as purchased electricity. The Port included electricity purchased for use in Port-controlled buildings and operations.

Scope 3 emissions—other indirect sources whose emission are a consequence of the Port’s activity but are not owned or controlled by the Port. The Port limited Scope 3 coverage to Port employee commuting.

The Port’s total GHG emissions in 2019 were almost 5,700 metric tons of carbon dioxide equivalent (MT CO₂e). As shown in Figure 1 and Table 1, electricity used in Port-controlled buildings was the dominant source of GHG emissions in 2019, accounting for 86% of total emissions. The next largest source was natural gas used in Port-controlled buildings, which represented 7% of total emissions.

Electricity purchased from Puget Sound Energy (PSE) was the largest source of emissions. PSE’s 2019 energy mix included a substantial portion of electricity generated from fossil fuels, resulting in relatively high emissions per unit of electricity consumed. In contrast, electricity purchased from Bonneville Power Administration (BPA) through the City of Blaine yielded much lower emissions per unit of electricity, due to a higher proportion of hydropower in BPA’s energy portfolio.

Figure 1: Port of Bellingham 2019 Greenhouse Gas Emissions in MT CO₂e

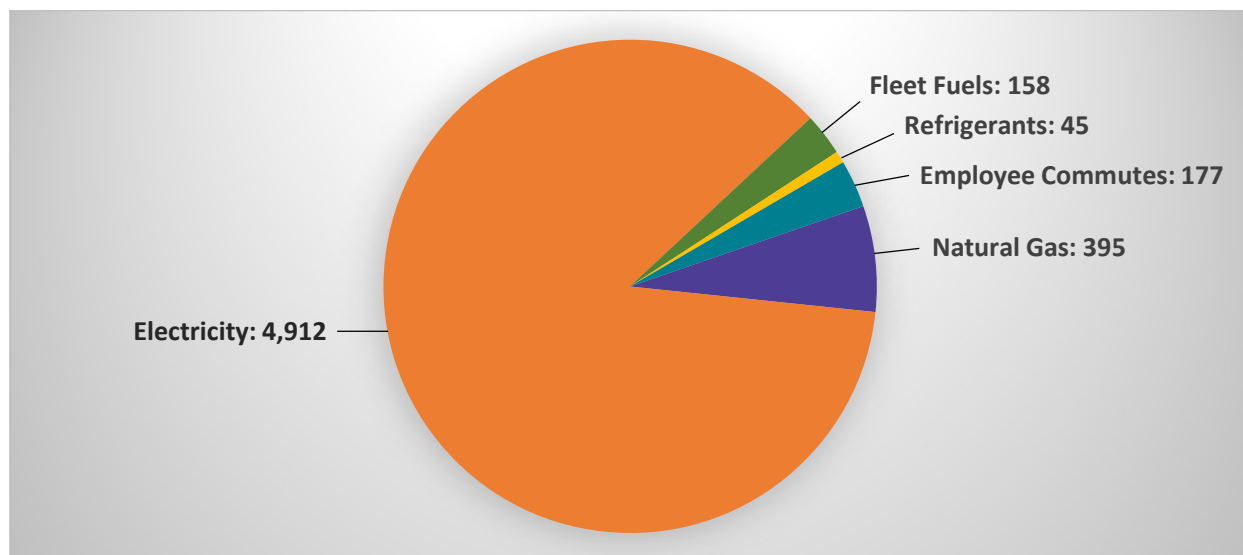


Table 1: Port of Bellingham 2019 GHG Inventory Results

SCOPE	SOURCE TYPE	SOURCE	USAGE	UNITS	EMISSIONS (MT CO _{2e})
1	Stationary	Natural Gas use in buildings	74,488	therms	395
	Mobile	Gasoline use in fleet	15,929	gallons	142
		Diesel use in fleet	1,588	gallons	16
		Total Fleet Fuels	17,517	gallons	158
	Fugitive Emissions	R-134a in buildings or fleet	2	pounds	1
		R-422 in buildings or fleet	42	pounds	44
		Total Refrigerant Emissions	44	pounds	45
	Biogenic (a)	B100 equivalent used in fleet	3	gallons	0
Scope 1 total					598
2	Indirect Energy	BPA electricity use	1,820,651	kWh	23
		PSE electricity use	9,199,794	kWh	4,888
		Total Electricity	11,020,445	kWh	4,912
Scope 2 total					4,912
3	Indirect	Employee Commutes	19,878	gallons	177
	Scope 3 total				
TOTAL EMISSIONS					5,687
(a) Emissions from biogenic fuel use are tallied separately and treated as “zero” for GHG inventory purposes.					

Methodology used to develop the 2019 GHG inventory

An Excel workbook (provided separately) includes emission calculations and detailed information about data sources, emission factors, emission estimation methods, references, and source files. The following is a summary of the methodology applied in the Excel workbook.

GHG protocol: The Port developed the inventory using The Climate Registry (TCR) General Reporting Protocol.²

Organizational Boundary: Per the TCR, the term "organizational boundary" refers to the activities within the Port's legal and organizational structure, such as wholly owned operations, divisions, subsidiaries and joint ventures. The GHG inventory is constructed to reflect the Port's operational control, which covers activities over which the Port has full authority to introduce and implement operating policies.

² <https://www.theclimateregistry.org/tools-resources/reporting-protocols/general-reporting-protocol/>

Operational Boundary: The inventory includes all facilities controlled by the Port for the operation of Port activities, and all staff employed at the Port. The term "operational boundary" defines the extent to which an organization has operational control over activities and includes Scope 3 emissions in its inventory. Quantifying Scope 1 and 2 emissions is mandatory. Including Scope 3 sources is optional, and the Port has latitude in determining the relevant activities and associated GHG estimation methods.

As discussed above, the Port included the following emission sources in its inventory:

- Scope 1 emissions—natural gas burned in Port-controlled buildings, fuel burned in Port-owned fleet buildings, and fugitive emissions from refrigerants used in Port-controlled buildings and vehicles.
- Scope 2 emissions—purchased electricity used for Port-controlled buildings and operations.
- Scope 3 emissions—Port employee commutes.

GHGs included: The inventory calculates emissions from the GHGs listed below.

- Carbon dioxide (CO₂):
- Methane (CH₄):
- Nitrous oxide (N₂O): and
- Hydrofluorocarbons (HFCs).

The Port does not include other recognized GHGs in the inventory because they are not associated with the Port's operations.

Except where noted, the inventory accounts for emissions of each gas separately, in metric tons of each gas. In addition, the inventory also accounts for non-CO₂ gases in units of carbon dioxide equivalent (CO₂e). Converting all emissions to CO₂e incorporates the global warming potential of each GHG to ensure an apples-to-apples comparison of emissions across multiple pollutants.

Emission Factors: Emission factors for each category came from published sources provided by the TCR protocol, the US Environmental Protection Agency, PSE, and BPA as detailed in the Excel workbook.

Calculation methods: The inventory applies calculation-based methods and simplified estimation methods described in the TCR protocol, as discussed below for each source.

Scope 1: Stationary source—natural gas used in Port-controlled buildings. This source includes natural gas used by the Port, and by tenants who are not directly sub-metered for their natural gas use. The Port's Accounts Payable Department provided account information. Natural gas consumption data for 2019 was obtained from the utility provider, Cascade Natural Gas. To calculate emissions, the total therms of natural gas was multiplied by emission factors for CO₂, CH₄, and N₂O. CO₂e emissions were calculated by applying the global warming potential to CH₄ and N₂O emissions and summing the emissions from each GHG.

Scope 1: Mobile sources—gasoline and diesel used in Port-owned fleet. All fuel used in the Port's fleet of vehicles, vessels, and equipment is purchased from Yorkston Oil Company. The vendor provided records of diesel, biodiesel, and gasoline purchases. To calculate emissions of CO₂, total gallons of each fuel was multiplied by the applicable emission factor. To calculate emissions of CH₄ and N₂O emissions,

The TCR's simplified estimation method was used. CO₂e emissions were calculated by applying the global warming potential to non-CO₂e emissions and summing the emissions from each GHG.

Scope 1: Mobile sources—biogenic fuels used in Port-owned fleet. Biogenic fuels are fuels made fully from plant-based sources. Burning biogenic fuels emits carbon that is part of the biogenic carbon cycle, whereas burning fossil fuels emits new sources of carbon that are stored in the earth (oil, natural gas, etc.) and considered to be anthropogenic. Following the TCR protocol, the inventory tracks the amount of biogenic fuels used, but does not account for carbon emissions from biogenic sources. The bio-based portion of biodiesel used by the Port is treated as a biogenic fuel with “zero” emissions.

Scope 1: Fugitive emissions—refrigerant leaks. Some refrigerants used in refrigeration and air conditioning systems buildings and vehicles are GHGs, such as hydrofluorocarbons (HFCs). Emissions result from leakage over the operational life of the equipment and disposal at the end of the useful life of equipment. The Port's Maintenance Department provided a summary of HFC purchases in 2019. The TCR's simplified mass balance approach was used to calculate fugitive emissions, assuming total purchased refrigerants represented the amount of leakage. To calculate emissions of each HFC, the HFC emissions in pounds were converted to MT. CO₂e emissions were calculated by applying the global warming potential to non-CO₂ emissions and summing the emissions from each HFC.

Scope 2: Indirect electricity emissions in Port-controlled facilities. This source includes electricity used by the Port, as well as electricity used by tenants who are not directly metered or sub-metered for their electricity use. For Port facilities in Blaine, electricity is provided by the City of Blaine, sourced from BPA. Electricity at all other Port locations is provided by PSE. The Port's Accounts Payable and Environmental Departments provided account information. Electricity consumption data for 2019 was obtained from the City of Blaine and PSE. Utility-specific emission factors were obtained from BPA and PSE. (GHG emission factors for electrical use are derived from the specific mix of fuel sources that each utility uses to generate power.) To calculate emissions, the total kWh of electricity was multiplied by the applicable emission factors for CO₂, CH₄, N₂O, and CO₂e.

Scope 3: Indirect emissions--Employee commutes. This category covers Port employee commute travel to and from assigned work sites. Total miles traveled by Port staff in single-occupancy vehicles were estimated from records of employee work schedules, commute modes, and anonymized home addresses. A simplified estimation method was used, assuming all vehicles were gasoline-powered with a typical fuel economy of 22 mpg.³ To calculate emissions of CO₂, total gallons of gasoline were multiplied by the applicable emission factor. To calculate emissions of CH₄ and N₂O emissions, the TCR's simplified estimation method was used. CO₂e emissions were calculated by applying the global warming potential to CH₄ and N₂O emissions and summing the emissions from each GHG.

³ <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

Limitations of the 2019 GHG inventory

The primary purpose of the inventory is to estimate the magnitude of the Port's Scope 1 - 2 emissions, as well as Scope 3 employee commute emissions, to inform the development of a climate action strategy. The inventory was developed to meet this need within time and budget constraints. The Port does not plan to have the inventory third-party verified. With this context in mind, several limitations of the inventory are noted below.

The Port intended to capture all Scope 1 and 2 emissions from Port-controlled building energy use in the inventory. The Port's definition of port-controlled building emissions appropriately includes emissions from tenant-occupied spaces that are not directly sub-metered. The inventory process did not document a comprehensive assessment of Port-owned facilities and associated leases to ensure the accuracy of the Port's list of "port controlled" utility accounts.

Simplified estimation methods that may be less accurate than more advanced methods were used to calculate emissions from mobile sources and employee commutes. Vehicle emissions of CH₄ and N₂O result from a vehicle's specific engine design and emission control system. Rather than compiling vehicle-specific data, the Port applied a default ratio of CH₄ and N₂O to the corresponding fleetwide CO₂ emissions, per the TCR's simplified estimation method. The Port also applied a simplified estimation method to calculate fugitive emissions from refrigerants.

Lastly, the Port's 2019 emissions inventory represents an estimate of emissions based on available data and standard calculation methods. Emissions estimates are subject to change as better source data, emissions factors, and calculation methodologies become available, or if the Port chooses to add other Scope 3 sources to the inventory.