

MEMORANDUM

DATE: March 19, 2024

TO: Adrienne Douglass-Scott, Port of Bellingham

FROM: Janice Gedlund, Cogent Environmental Consulting, LLC 

SUBJECT: Final 2023 Greenhouse Gas Inventory for Port of Bellingham

Introduction

Cogent Environmental Consulting, LLC has worked closely with the Port of Bellingham (Port) to complete a greenhouse gas (GHG) inventory of Port-controlled emissions for the 2023 calendar year. This memo summarizes the results, scope, methodology, and limitations of the Port's 2023 GHG Inventory (Inventory) and discusses GHG emission trends from 2019-2023.

For more details on the 2023 Inventory process, please see the *POB 2023 GHG Inventory Calculator FINAL 2024-03-04.xlsx* tool (provided separately). This spreadsheet-based workbook includes emission calculations and detailed information about data sources, emission factors, emission estimation methods, references, and source files.

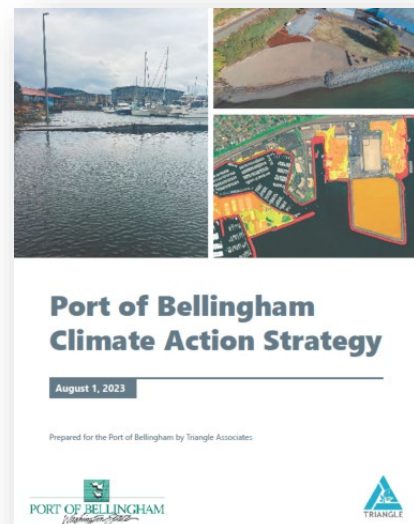
Overview

Purpose of the Inventory

The Port voluntarily conducts a periodic GHG Inventory as part of its commitment to environmental sustainability. This GHG accounting will help the Port track its progress in implementing its Climate Action Strategy and meet Green Marine performance measures. In fact, the Climate Action Strategy calls for annual GHG inventories.

What's included in the Inventory

The Inventory quantifies calendar year 2023 GHG emissions from the Port's direct operations, such as use and maintenance of the Port's fleet of vehicles, vessels, and equipment and Port-controlled buildings and facilities. The Inventory also includes emissions from employee commuting of Port staff, which the Port can influence.



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

- **Scope 1 sources:** 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 sources:** indirect sources such as purchased electricity. This encompasses electricity purchased for use in Port-controlled buildings and operations.
- **Scope 3 sources:** another indirect source which the Port has chosen to track is employee commutes.

What's not included in the Inventory

The Inventory does not include emissions from tenant-controlled activities such as tenant-purchased energy or operation of tenant-owned fleets (vehicles, vessels, aircraft, or other equipment.) It does not include other indirect sources such as the Port's purchased goods and services, or generation of solid waste. These indirect sources were deemed a lower priority because the Port has less control or influence over them.

Inventory Results

2023 GHG emissions

In 2023, the Port's GHG emissions totaled 910 metric tons of carbon dioxide equivalents (MT CO₂e).

The leading source of GHG emissions was use of natural gas in Port-controlled buildings, accounting for 41% of the total. The next largest source was the use of fossil fuels in the Port's fleet (29% of total) followed by electricity use in Port-controlled buildings (19% of total). Employee commute emissions accounted for 11% of total emissions in 2023. Fugitive emissions of refrigerant (from vehicle air-conditioning systems) represented less than 1% of the year's total emissions.

The Port significantly reduced its 2023 electricity emissions by continuing to purchase Puget Sound Energy's Green Direct power for most Port-controlled electricity accounts. Green Direct is sourced entirely from renewable energy and is considered zero-emission for inventory purposes. Over 1,800 MT CO₂e emissions were avoided by the Port's use of Green Direct power in 2023. The Port also continued to reduce electricity purchases by generating clean power from the solar array on the roof of the Bellingham Cruise Terminal, installed in 2021.

On the following page, Figure 1 shows the distribution of the Port's 2023 emissions, and Table 1 tallies the 2023 emissions.

Figure 1: Distribution of Port of Bellingham 2023 GHG Emissions

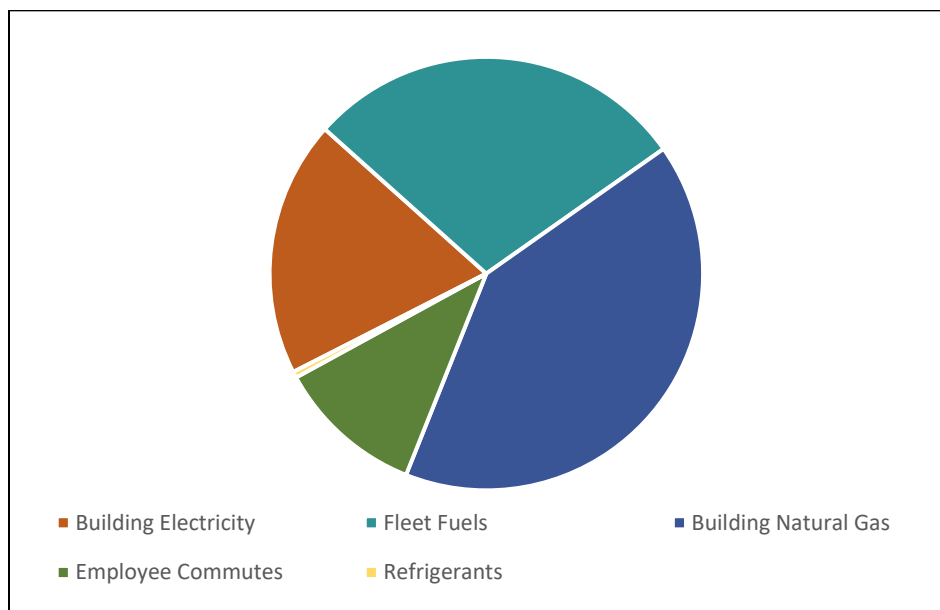


Table 1: 2023 GHG Emissions of Port of Bellingham

SCOPE	SOURCE TYPE	SOURCE	2023 MT CO ₂ e
1	Stationary	Natural Gas use in buildings	371
	Mobile	Gasoline use in fleet	194
		Diesel use in fleet	62
		Propane use in fleet	4
		Total Fleet Fuels	260
	Fugitive	Refrigerant releases (R-134a)	4
SCOPE 1 EMISSIONS			636
2	Indirect	BPA Electricity use	5
		PSE Electricity use – Green Direct	-
		PSE Electricity use – general fuel mix	169
		Total Electricity	174
SCOPE 2 EMISSIONS			174
	Miscellaneous	Employee Commutes	100
	SCOPE 3 EMISSIONS		
TOTAL EMISSIONS			910

Energy use and emission trends 2019-2023

The Port has developed GHG inventories for the years 2019, 2022, and 2023 (this Inventory). The 2019 inventory is the baseline used to evaluate progress over time. With only two subsequent inventories, there are few datapoints to distinguish the impacts of emission reduction initiatives from the impacts of fluctuating weather conditions and Port activity levels which affect energy use.

That said, the Port's GHG 2023 emissions total of 910 MT CO₂e is 13% below 2022 emissions and 78% less than 2019 (base year) emissions, as detailed in Figure 2 and Table 2 below.

Figure 2: Port of Bellingham Greenhouse Gas Emissions 2019, 2022, & 2023 (MT CO₂e)

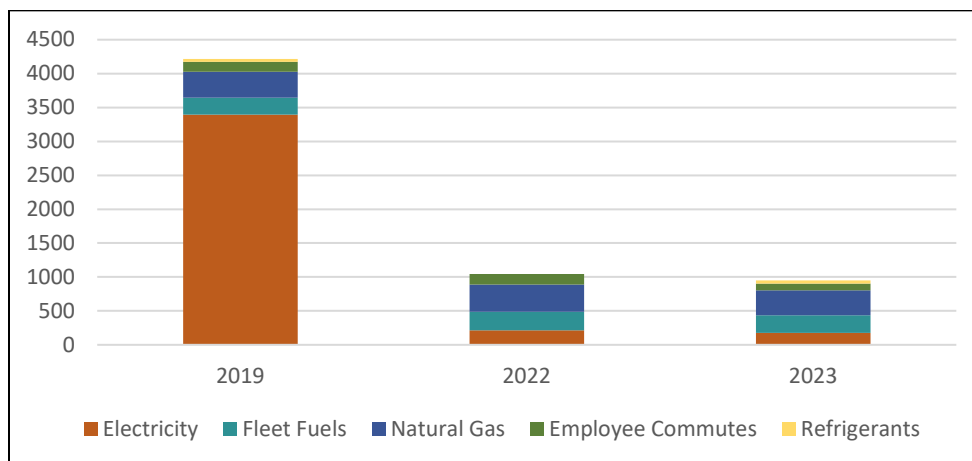


Table 2. Port of Bellingham Greenhouse Gas Emissions 2019, 2022, & 2023 (MT CO₂e)

SCOPE	SOURCE TYPE	SOURCE	2019	2022	2023
1	Stationary	Natural Gas use in buildings	380	403	371
	Mobile	Gasoline use in fleet	158	174	194
		Diesel use in fleet	87	94	62
		Propane use in fleet	8	7	4
		Total Fleet Fuels		253	275
	Fugitive	Refrigerant releases	44	0	4
SCOPE 1 EMISSIONS			677	678	636
2	Indirect	BPA Electricity use	3	4	5
		PSE Electricity use – Green Direct	0	0	0
		PSE Electricity use – general fuel mix	3,390	209	169
		Total Electricity		3,393	213
SCOPE 2 EMISSIONS			3,393	213	174
	Miscellaneous	Employee Commutes	148	152	100
	SCOPE 3 EMISSIONS		148	152	100
TOTAL EMISSIONS			4,218	1,043	910

Source-specific emission trends are discussed below.

Natural gas: Therms of natural gas used, and associate GHG emissions, dipped slightly below the 2022 and 2019 levels; this probably represents normal variation.

Fleet fuels: The aggregated gallons of fleet fuels, and associated emissions, were slightly above the 2019 base level; this probably represents normal variation. Looking at specific fuels, gasoline emissions were 23% higher in 2023 than in 2019, while diesel emissions were 29% lower in 2023 than in 2019.

Electricity: The Port aims to enhance energy efficiency of Port buildings and operations; thus, it tracks energy usage as well as GHG emissions over time, as shown in Table 3 below. Electricity usage in 2023 was 21% less than in 2019. Electricity usage declined with the installation of rooftop solar panels at the Bellingham Cruise Terminal in 2021. The cause of reduced energy use at other Port-controlled buildings in Bellingham is unclear. Electricity use at Blaine Harbor marina increased in 2023.

In 2022 and 2023, about 90% of the electricity purchased from PSE was Green Direct renewable energy. The purchase of Green Direct renewable energy in 2022-2023 has reduced the Port's GHG emissions by 3,711 MT CO₂e.

Table 3: Electricity Use at Port of Bellingham 2019, 2022 & 2023

ELECTRICITY SOURCE	2019 USAGE (kWh)	2022 USAGE (kWh)	2023 USAGE (kWh)
BPA (City of Blaine)	255,411	254,346	278,434
PSE Green Direct*	0	4,552,285	4,513,440
PSE general fuel mix	6,379,841	520,030	420,644
Total	6,635,252	5,326,661	5,212,518

*The Port began using Green Direct electricity in 2021.

Employee commutes: Although the Port's workforce grew in 2023 and miles traveled by various modes increased, employee commute emissions dropped significantly, to 100 MT CO₂e. This is due to updated emission factors provided by the U.S. Environmental Protection Agency (EPA), which states that this is "...partially due to a methodology change in the allocation of emissions to vehicle type." ¹

Fugitive emissions: Refrigerant emissions totaled 4 lb. in 2023, compared to zero leaks in 2019, and 44 lb. released in 2019. Fugitive emissions are likely to fluctuate year to year depending on preventive maintenance practices and the age or condition of cooling systems.

Emissions Inventory Approach

As in the previous inventories, the 2023 Inventory work was guided by standard GHG accounting and reporting principles to give accurate, reliable, and repeatable results.

¹ <https://www.epa.gov/system/files/documents/2024-02/ghg-emission-factors-hub-2024.pdf>

GHG protocol

The Port is using The Climate Registry (TCR) General Reporting Protocol, which is a widely used methodology for GHG accounting.² The Port has indicated that it does not plan to have the inventory third-party verified at this time, which is an optional step under the protocol.

Organizational Boundary

Per the TCR, the term "organizational boundary" refers to the activities within the Port's legal and organizational structure. This GHG inventory reflects the Port's operational control, which covers activities over which the Port has full authority to introduce and implement operating policies. The organizational boundary used in this year's Inventory is consistent with that used in prior inventories.

Operational Boundary

Per the TCR, 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. See pages 1-2 for a list of emissions sources included in the Inventory. The operational boundaries have remained constant in the 2019, 2022 and 2023 GHG inventories. See pages 1-2 for a list of emissions sources included in the Inventory.

GHGs included

The Inventory calculates emissions from the GHGs listed below. These include:

- **GHGs emitted from combustion of fossil fuels:** carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).
- **GHGs emitted by electric utilities in production of electricity:** sulfur hexafluoride (SF₆).
- **GHGs emitted from air conditioning or refrigeration systems:** Hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Other recognized GHGs are not included 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 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.

Data sources

The Port provided summaries of relevant data on fuel and energy purchases, copies of some supplier invoices, and some usage reports from electric utilities. Key staff provided insight into operational practices relating to GHG emissions.

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

Emission factors

Emission factors for each category came from published sources such as the US Environmental Protection Agency (EPA), The Climate Registry (TCR), Puget Sound Energy (PSE), and Bonneville Power Administration (BPA) as detailed in the GHG Calculator workbook. GHG emission factors for electrical use are derived from the specific mix of fuel sources that each utility uses to generate power and may change from year to year. In addition, in 2023 some Port-controlled electricity was sourced from PSE's Green Direct program which generates 100% renewable power with an emission factor of zero.

Calculation methods

The Inventory applies calculation-based methods and simplified estimation methods depending on source, as described in the *POB 2023 GHG Inventory Calculator*.

Documentation

As noted above, an Excel workbook (*POB 2023 GHG Inventory Calculator*) prepared for each inventory year houses emission calculations and detailed information about data sources, emission factors, emission estimation methods, references, and source files. Backup documents were provided to the Port.

Base year recalculations

In 2020, the Port established 2019 as the base year to track its emissions over time. The 2019 emissions were recalculated concurrently with development of the 2022 Inventory. Future base year recalculations may occur to address changes in the Port's organizational boundaries, changes in calculation methodologies, or the discovery of errors that would significantly alter base year results, i.e., change them by 5% or more.

Emission trends

To aid in tracking emissions, the 2023 GHG Calculator workbook includes information about emissions in the base year (2019) and in 2022 to show the emissions profile over time.

Methodology Updates

Several adjustments were made in the 2023 Inventory to reflect updated methodologies.

Methodology changes applied to the 2022 emission calculations

Electricity: When the 2022 GHG Inventory was completed, PSE had not yet published its 2022 GHG emissions inventory; thus its 2021 emission factors were applied to PSE electricity usage in 2022. PSE subsequently published its 2022 emission factors, so 2022 electricity emissions were recalculated using the 2022 emission factors. This reduced the Port's 2022 electricity emissions by 7 MT CO₂e (from 220 to 213 MT CO₂e). (The recalculated 2022 emissions are shown in the *POB 2023 GHG Inventory Calculator*, *Tab 13-Multiyear Emissions*.)

Emission factor updates applied to 2023 emission calculations

The most recently published emission factors applicable to 2023 emissions were used in this Inventory, including:

- updated simplified estimation method for CH₄ and N₂O for gasoline and diesel, from TCR Default Emission Factors
- 2023 emission factor for BPA electricity, sold by the City of Blaine
- 2022 emission factor for PSE electricity (the most recent available)
- updated emission factors for employee commute emissions, from the EPA GHG Emission Factors Hub

Additionally, the February 2024 EPA GHG Emission Factors Hub updated the global warming potentials (GWPs) which are used to calculate carbon dioxide equivalents (CO₂e) for individual GHGs. In this version, EPA adopted the GWPs from the Intergovernmental Panel on Climate Change Fifth Assessment Report (AR5). AR5 provides the following GWPs: CH₄ GWP of 28; N₂O GWP of 265; SF₆ GWP of 23,500; HFC (R-34a) GWP of 1,300; and HFC (R-422b) GWP of 2,290.

Most of the references cited in the *POB 2023 GHG Inventory Calculator, Tab 4- Emission Factors* rely on the Intergovernmental Panel on Climate Change Fourth Assessment Report (AR4) for GWPs. AR4 GWP are as follows: CH₄ GWP of 25; N₂O GWP of 298; and SF₆ GWP of 22,800.

EPA's most recent guidance (based on AR5) was used, where applicable, to calculate 2023 emission factors. However, CO₂e values for 2019 (base year) or 2022 emissions were not adjusted to reflect AR5 GWPs because the results would be insignificant (below 1% of previously calculated values).

Tab 4 – Emissions Factors in the *POB 2023 GHG Inventory Calculator* has been updated to show which GWPs are applied to each emission factor.

Data Anomalies

The following anomalies may limit the accuracy of the Inventory. Resolving these anomalies is beyond the scope of the Inventory project, but we understand that the Port is investigating these items.

PSE Green Direct Electricity: As noted in the *POB 2023 GHG Inventory Calculator*, there is a question re: whether five electricity accounts were included in the PSE Green Direct program in 2023. These accounts were originally designated to receive renewable electricity via the Port's Green Direct contract with PSE in 2019, but they were not flagged as Green Direct accounts in a November 2023 communication from PSE. For inventory purposes, it was assumed that the electricity used by these accounts was renewable, i.e., zero emissions.

Conclusions

The Port's 2023 GHG Inventory quantifies Port-controlled and Port-influenced emission sources for calendar year 2023. The sources inventoried were natural gas used in Port-controlled buildings, electricity used in Port-controlled facilities, fuels used in the Port-owned fleet, refrigerants released from the Port's air conditioning and refrigeration systems, and employee commutes.

The Port's 2023 GHG emissions totaled 910 MT CO₂e, which is 13% below the 2022 emission level and 75% lower than 2019 (base year) emissions. Reductions stem primarily from the Port's switch to PSE's Green Direct power for most port-controlled uses, and data indicating reduced electricity use by Port-controlled buildings. Emissions from natural gas were slightly lower in 2023 than in 2019 and 2022, while emissions from fleet fuel use were slightly higher in 2023 than in 2019; these may indicate normal fluctuation in activity levels or weather conditions. Emissions from employee commutes decreased significantly in 2023; however, this was due to more favorable emission factors rather than a reduction in activity levels.

The Port's 2023 GHG Inventory is an estimate of emissions based on available data and standard calculation methods, using recognized GHG protocols. 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. Conducting periodic inventories is an effective way to gauge progress as the Port implements its Climate Action Strategy.