

MEMORANDUM

DATE: March 19, 2024

TO: Adrienne Douglass-Scott, Port of Bellingham

FROM: Janice Gedlund, Cogent Environmental Consulting, LLC 

SUBJECT: Revised Port of Bellingham 2022 Greenhouse Gas Inventory

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 2022 calendar year, and to recalculate emissions for 2019, the Port's baseline year. It was important to recalculate base year emissions to ensure consistency in methodologies from year to year, thus improving your ability to analyze emission trends over time.

This memo summarizes the results, scope, methodology, and limitations of the Port's 2022 GHG Inventory (Inventory) and the recalculated 2019 base year emissions. **Please note that this report reflects revised totals for 2019 and 2022 emissions, correcting an error found in the diesel emissions calculations in the earlier version of the report dated December 29, 2023.**

For more details on the Inventory process, please see the *POB 2022 GHG Inventory Calculator REV FINAL 2024-01-22.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. It includes recalculated totals for the 2019 base year, as well as the 2022 Inventory.

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.

What's included in the Inventory

The Inventory quantifies calendar year 2022 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. Lastly, the Inventory includes updated calculations of 2019 (base year) emissions.

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 bought for use in Port-controlled buildings and operations.
- **Scope 3 sources:** another indirect source which the Port has chosen to track is employee commutes.

Inventory Results

Recalculated 2019 (base year) GHG emissions

The 2022 Inventory keeps 2019 as the base year against which the Port's future emissions will be tracked over time. However, the 2019 emissions were recalculated based on new data and updated methodologies which are discussed later in this report. Recalculating base year emissions is recommended whenever new information becomes available that would alter emission totals beyond a pre-determined threshold, such as 5% of total emissions. Beyond that threshold, recalculating base year emissions is worthwhile, as it ensures consistency in methodologies from year to year. Maintaining consistency improves your ability to analyze emission trends over time.

Table 1 shows the initial and recalculated 2019 base year emission estimates. Overall, the recalculated 2019 emission total is 26% lower than the original total for these reasons:

- Based on the Port's deep dive into utility accounts, some natural gas and utility accounts initially classified as "Port-controlled" were determined to be tenant-controlled, so were dropped from the 2019 data set. (For example, accounts measuring electricity of privately-owned vessels moored at the marinas had previously been misclassified as "Port-controlled.") This was the primary factor in the reduced total emissions.¹
- Missing data on fuel dispensed from the Port's onsite fuel tanks and propane usage was added to the 2019 data set, increasing total emissions.

¹ For GHG inventory purposes, the Port classifies an electricity or natural gas account as "Port-controlled" if the Port's share of the metered usage is at least 66%; if so, 100% of the metered usage is then attributed to the Port when calculating GHG emissions (because in this case, tenant usage is typically not directly metered). The designation of individual energy accounts as Port-controlled vs tenant-controlled can thus change from year to year depending on building/facility occupancy and use, changes in metering configurations, or changes in energy billing methods.

- Employee commute emissions were recalculated using a more accurate emission factor, which reduced the 2019 total emissions.

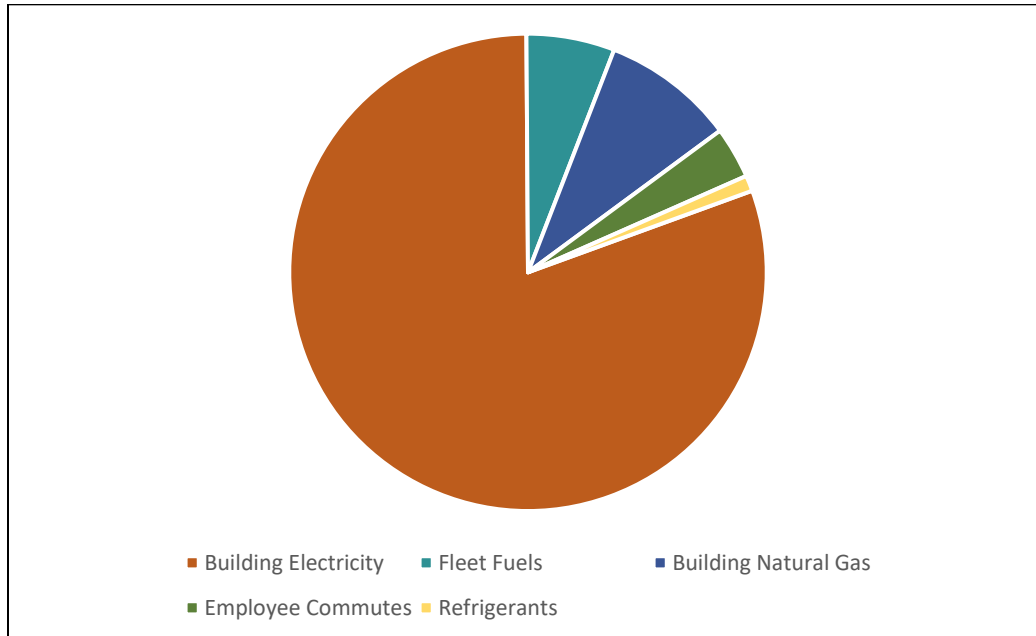
The recalculated 2019 emissions total is 4,218 metric tons of carbon dioxide equivalent (MT CO₂e). As shown in Figure 1, electricity used in Port-controlled buildings was the dominant source of GHG emissions in 2019, accounting for 80% of total emissions. Other emissions sources were natural gas used in Port-controlled buildings (9%), fuel used in the Port's fleet (6%), employee commutes (4%), and fugitive refrigerant emissions (1%).

Electricity purchased from Puget Sound Energy (PSE) was the largest source of emissions. In 2019, PSE's general fuel mix included a substantial portion of electricity generated from fossil fuels, resulting in 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.

Table 1: Initial & Recalculated 2019 (Base Year) GHG Emissions of Port of Bellingham

SCOPE	SOURCE TYPE	SOURCE	MT CO2e		
			INITIAL 2019	RECALC. 2019	Difference
1	Stationary	Natural Gas use in buildings	395	380	(15)
	Mobile	Gasoline use in fleet	142	158	16
		Diesel use in fleet	16	87	71
		Propane use in fleet	0	8	8
		Total Fleet Fuels	158	253	95
	Fugitive	Refrigerant releases	45	45	0
SCOPE 1 EMISSIONS			598	677	79
2	Indirect	BPA Electricity use	23	3	(20)
		PSE Electricity use (a)	4,888	3,390	(1,498)
		Total Electricity	4,912	3,393	(1,519)
SCOPE 2 EMISSIONS			4,912	3,393	(1,519)
	Miscellaneous	Employee Commutes	177	148	(29)
SCOPE 3 EMISSIONS			177	148	(29)
TOTAL EMISSIONS			5,687	4,218	(1,469)

Figure 1. Distribution of Port of Bellingham Recalculated 2019 (Base Year) GHG Emissions



2022 GHG emissions

In 2022, the Port's GHG emissions totaled 1,050 MT CO₂e, which is 75% less than the recalculated 2019 base year emissions. Although 2022 electricity use was 20% less than in 2019, the primary cause of the steep GHG reduction was the use of PSE'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. Almost 1,900 MT CO₂e were avoided by the Port's use of Green Direct power in 2022.

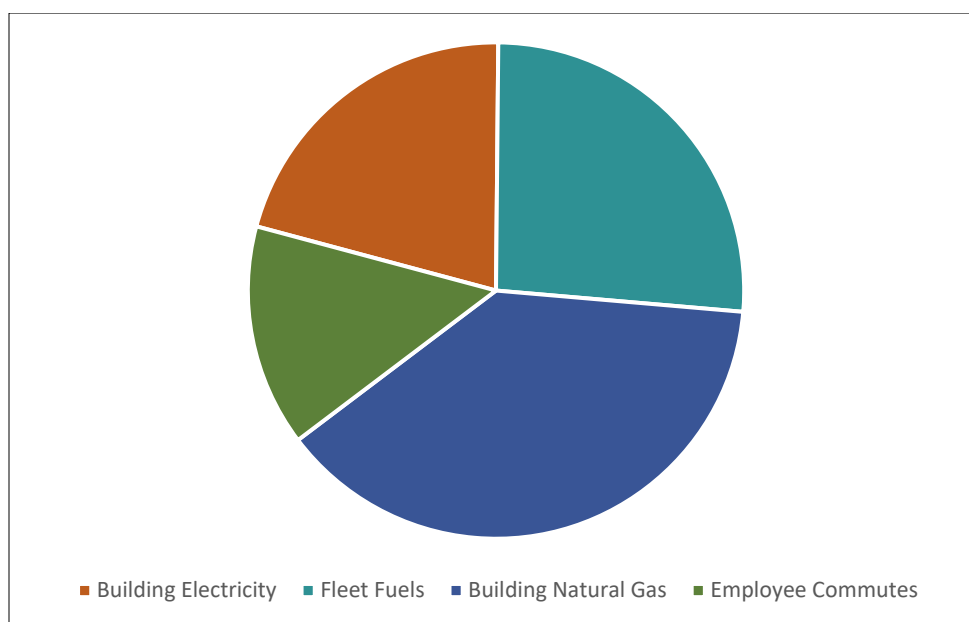
With electricity emissions decreasing, natural gas and fleet fuels became the dominant emission sources, followed by employee commutes. No releases of refrigerants/coolants from buildings or vehicles were reported in 2022.

On the following page, Table 2 summarizes the 2022 GHG emissions, and Figure 2 shows the distribution of emission sources in 2022.

Table 2: 2022 GHG Emissions of Port of Bellingham

SCOPE	SOURCE TYPE	SOURCE	2022 MT CO ₂ e
1	Stationary	Natural Gas use in buildings	403
	Mobile	Gasoline use in fleet	174
		Diesel use in fleet	94
		Propane use in fleet	7
		Total Fleet Fuels	275
	Fugitive	Refrigerant releases	0
SCOPE 1 EMISSIONS			678
2	Indirect	BPA Electricity use	4
		PSE Electricity use – Green Direct	0
		PSE Electricity use – general fuel mix	216
		Total Electricity	220
SCOPE 2 EMISSIONS			220
	Miscellaneous	Employee Commutes	152
	SCOPE 3 EMISSIONS		
TOTAL EMISSIONS			1,050

Figure 2: Distribution of Port of Bellingham 2022 GHG Emissions*



*There were no fugitive emissions from refrigerants in 2022.

Energy use and emission trends 2019-2022

With only one year's emissions quantified since the base year inventory, it is difficult to analyze trends. Some fluctuation in energy use is normal due to changes in Port operations and activity levels, weather conditions, and economic patterns. However, as shown in Figure 3 (on page 7), GHG emissions were 75% lower in 2022 than in 2019. A few observations are noted below, using the recalculated 2019 emissions as the basis for comparison.

- **Electricity:** Per the Port's Climate Action Strategy, the Port aims to enhance energy efficiency of Port buildings and operations; thus, it will track energy usage as well as GHG emissions over time. Electricity usage in 2022 was 20% less overall than in 2019, as shown below in Table 3. Some of this is due to installation of rooftop solar panels at the Bellingham Cruise Terminal in 2021, which reduced electricity purchases from the grid and generated clean power. The cause of reduced energy use at other Port-controlled buildings is unclear and may indicate a data anomaly, as discussed elsewhere in this report.

In 2022, about 90% of the electricity purchased from PSE was Green Direct renewable energy, which reduced 2022 electricity-associated emissions by 94% compared to 2019.

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

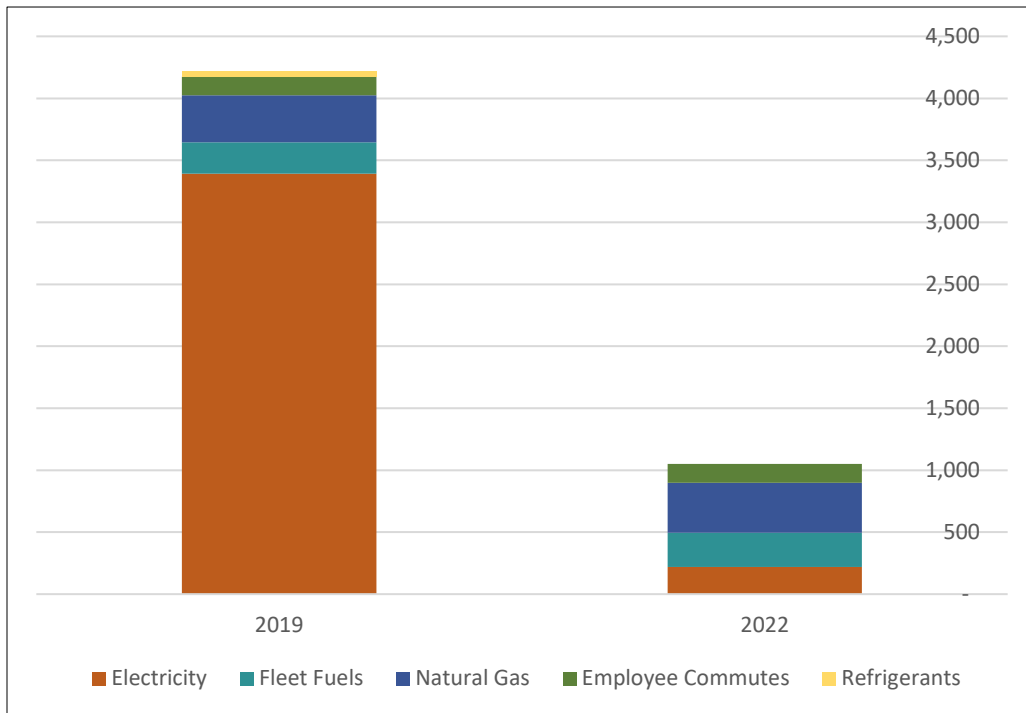
ELECTRICITY SOURCE	2019 USAGE (kWh)*	2022 USAGE (kWh)
BPA (City of Blaine)	255,411	254,346
PSE Green Direct**	0	4,552,285
PSE general fuel mix	6,379,841	520,030
Total	6,635,252	5,326,661

*Limited to Port-controlled accounts included in recalculated 2019 Scope 2 emissions.

**The Port began using Green Direct electricity in 2021.

- **Natural gas:** Therms of natural gas used, and associated emissions, were 6% higher in 2022 than in 2019.
- **Fleet fuels:** Gallons of fleet fuels, and associated emissions, were 9% higher in 2022 than in 2019.
- **Employee commutes:** Employee commute miles were 11% higher in 2022 compared to 2019, while associated emissions were only 3% higher. We used a revised method to estimate employee commutes in 2022 which may account for the differences.
- **Fugitive emissions:** No releases of refrigerants/coolants from buildings or vehicles were reported in 2022, compared to 44 pounds in 2019. Fugitive emissions are likely to fluctuate year to year depending on preventive maintenance practices and the age or condition of cooling systems.

Figure 3: Port of Bellingham GHG Emissions 2019 & 2022 (In MT CO₂e)



Emissions Inventory Approach

As in the 2019 base year inventory, the 2022 Inventory work was guided by standard GHG accounting and reporting principles to give accurate, reliable, and repeatable results. Assumptions and methods used are well-documented, providing transparency.

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.

The 2022 Inventory uses organizational and operational boundaries (defined in the TCR protocol) that are consistent with those in the 2019 base year inventory.

GHG Reporting Principles

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

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

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 (MT) 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. The Port reassessed its assignment of electricity and natural gas accounts as "Port-controlled" vs. "tenant-controlled" to ensure accurate designation of Scope 1 natural gas use and Scope 2 electricity use for years 2019 and 2022.

Emission factors

Emission factors for each category came from published sources such as the US Environmental Protection Agency, The Climate Registry, 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 2022 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 GHG Calculator tool.

Documentation

As noted above, an Excel workbook (GHG 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.

Emission trends

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

Methodology Updates

For the 2022 Inventory, the adjustments described below were used to recalculate the 2019 base year Inventory, and several methodology changes were made in calculating the 2022 Inventory.

Methodology changes applied to the recalculated 2019 (base year) emissions

Electricity: As previously recommended, the Port reassessed its 2019 electricity accounts while gathering data for the 2022 Inventory to ensure accurate designation of Scope 2 (Port-controlled) electricity use. (POB kept its working definition of "Port-controlled" accounts to include 100% of metered usage when the Port's share of a particular metered use was at least 66%.) As a result, some usage--primarily from moorage and a few tenant-occupied spaces--was reclassified as "tenant-controlled" and were dropped from the data set used to recalculate 2019 Scope 2 electricity emissions.

Natural Gas: As previously recommended, the Port reassessed its 2019 natural gas accounts while gathering data for the 2022 Inventory to ensure accurate designation of Scope 1 (Port-controlled) natural gas use. (POB kept its working definition of "Port-controlled" accounts to include 100% of metered usage when the Port's share of a particular metered use was at least 66%.) Several accounts were reclassified as tenant-controlled and were dropped from the data set used to recalculate the 2019 Scope 1 natural gas emissions.

Fleet Fuels: A prior analysis of the 2019 inventory had found potential data gaps in fleet fuels data. When gathering data for the 2022 Inventory, we also obtained the missing 2019 data which covered diesel and gasoline dispensed from the Port's onsite fuel tanks, as well as propane usage. Emissions from 2019 fleet fuels were then recalculated.

Employee Commutes: The original 2019 inventory used average fuel efficiency found in an EPA document that relied on 2016 data. In conducting the 2022 Inventory, a more recent source of employee commute emissions was found in EPA's GHG Emission Factors Hub which is updated annually. Emissions from 2019 employee commutes were recalculated using this source, thus providing a more accurate estimate of emissions from employee commutes based on average fuel efficiency of vehicles on the road in 2019.

Methodology changes applied to the 2022 emissions

Electricity: PSE accounts were sorted by those using Green Direct renewable energy and those using electricity from PSE's general fuel mix, and the appropriate emission factor was applied to electricity usage of each source.

Employee Commutes: An employee survey was conducted in May 2023 to gather information on employee commuting practices including mode of transportation, distance traveled, and number of commuting trips/week. The survey was modeled after Washington State Department of Transportation Commute Trip Reduction surveys. Based on the 68% response rate, results were scaled up to represent 100% of the POB workforce over an entire year. The annual number of miles per transport mode was multiplied by the applicable EPA emission factors for CO₂, CH₄, and N₂O from EPA's Greenhouse Gas Emissions Hub.

This approach was an enhancement of the methodology used in the 2019 (base year) Inventory. For the 2019 inventory, POB tallied employee commute trip distance and commuting frequency based on

existing records. All miles traveled were assumed to be made by single-occupancy vehicles, and all vehicles were assumed to be gasoline-powered passenger cars or light-duty trucks with average fuel economy of 22 miles per gallon.³ The estimated gallons of fuel were multiplied by the EPA CO₂ emission factor; and the TCR simplified estimation method was used to quantify CH₄ and N₂O emissions.

Emission factor updates

The most recently published emission factors applicable to 2022 emissions were used in this Inventory, including:

- updated TCR simplified estimation method for CH₄ and N₂O for gasoline and diesel
- 2022 emission factor for BPA electricity, sold by the City of Blaine
- 2021 emission factor for PSE electricity (the most recent available)
- 2022 emission factors for employee commute emissions, from EPA GHG Emissions Hub

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.

Electricity usage: It was noted that electricity usage (of many individual accounts, as well as total usage) was much lower in 2022 than in 2019. While it is likely that solar panels at the Bellingham Cruise Terminal have contributed to the drop in electricity use, precise data on their energy generation was not available. Also, because other accounts showed reduced use, the Port should confirm that this is accurate, identify the reasons for lower usage, and/or check whether there were errors in transcribing 2019 electricity data.

PSE Green Direct Electricity: As noted in the POB 2022 GHG Inventory Calculator, there is a question re: whether five electricity accounts were included in the PSE Green Direct program in 2022. These accounts were originally chosen 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 2022 GHG Inventory quantifies Port-controlled and Port-influenced emission sources for calendar year 2022 and recalculates 2019 (base year) emissions. 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.

³ Average fuel economy from "Greenhouse Gas Emissions from a Typical Passenger Vehicle," EPA 420-F-18-008, March 2018.

Recalculating the 2019 (base year) Inventory reduced the baseline emissions by 26% from previously calculated emissions. Emissions were recalculated by refining the list of Port-controlled buildings (dropping some tenant-controlled uses), addressing data gaps in fleet fuel use, and applying a more accurate emission factor to employee commutes.

The Port's 2022 GHG emissions were 75% lower than its recalculated 2019 base year emissions. The bulk of the emission reduction stems from the Port's switch to PSE's Green Direct power for most of its electricity needs, and data indicating reduced electricity use by Port-controlled buildings. However, emissions from natural gas, fleet fuels, and employee commutes were higher in 2022 than in 2019.

The Port's 2022 emissions 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.