

Port of Anacortes Greenhouse Gas Inventory 2019-2021

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Prepared for:



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Introduction

Cogent Environmental Consulting, LLC has worked closely with the Port of Anacortes (Port) to complete a greenhouse gas (GHG) inventory of annual Port-controlled emissions for the past three years: 2019, 2020, and 2021. This report summarizes the scope, methodology, limitations, and results of the Port's 2019-2021 GHG Inventory (Inventory) and includes recommendations for an on-going GHG accounting program.

For more details on the Inventory process, please see the GHG Calculator tool for each inventory year (provided separately.) These spreadsheet-based workbooks include 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 chose to conduct the Inventory as part of its commitment to environmental sustainability. Being a member of Green Marine, a voluntary certification organization for the marine industry,¹ the Port has committed to continually improve its environmental performance. Per Green Marine's current Performance Indicators for GHGs, one element of measured performance is an annual GHG inventory of Scope 1 and Scope 2 sources.² Such GHG accounting will help the Port establish its baseline carbon footprint and enable the Port to set GHG emission reduction targets. Future inventories can be used to track progress in reducing GHG emissions, improvements to efficiency, and environmental performance.

This Inventory, which is focused on Port-controlled emissions, will also complement indirect Port-related emissions being quantified via the 2021 Puget Sound Maritime Air Emissions Inventory (PSMAEI), a regional effort that is currently underway, giving a fuller picture of Port-related GHG emissions.

What's included in the Inventory

The Inventory quantifies annual GHG emissions for years 2019, 2020, and 2021 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 breaks out emissions by operational sector: Airport, Marina, Marine Terminal, Properties, and General Administration.

¹ *Green Marine*. [Home | Green Marine \(green-marine.org\)](https://www.green-marine.org). Accessed April 1, 2022.

² "Certification/Performance Indicators/Greenhouse Gas Emissions." *Green Marine*. [Greenhouse gas emissions | Green Marine \(green-marine.org\)](https://www.green-marine.org). Accessed April 1, 2022.

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.

What's excluded from the Inventory

The Inventory does not include **Scope 3 sources** — other indirect sources whose emissions are a consequence of the Port's activity but are not owned or controlled by the Port. Examples of Scope 3 sources that were excluded from this Inventory include tenant-controlled use of energy in Port buildings (e.g., when a tenant is metered directly for energy use), employee commuting, and waste generated from operations.

Perhaps the most significant Scope 3 category excluded from this Inventory is the "supply chain" related to the Port's lines of business. Maritime-related supply chain sources include cargo vessels, loading equipment, rail, drayage trucks, harbor craft, and recreational vessels. However, emissions from these sources are quantified in the PSMAEI.³ The Port is currently participating on the multi-agency committee conducting a 2021 update to the PSMAEI, which is conducted every five years. There is no similar effort to quantify emissions from the Port's airport-related supply chain.

Emissions Inventory Approach and Methodology

The Inventory calculates annual emissions from the Port's direct operations of its fleet and facilities. Typically, this is done by combining source data (gallons of fuel, kilowatt-hours of electricity, etc.) with applicable emission factors (average emission rate of a given source) which yields metric tons (MT) of GHG emitted per year. Inventory work was guided by standard GHG accounting and reporting principles to render fair, reliable results as discussed below.

GHG protocol

The Inventory follows the methodology outlined in The Greenhouse Gas Protocol Corporate Accounting and Reporting Standard (GGP), the most widely used methodology for GHG accounting.⁴ The Port has indicated that it does not plan to have the Inventory third-party

The Greenhouse Gas Protocol

GHG Accounting and Reporting Principles

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

³ Puget Sound Maritime Air Forum. [Puget Sound Maritime Air Forum – Committed to reducing air emissions associated with the maritime transportation of freight and passengers](#). Accessed August 1, 2022.

⁴ Greenhouse Gas Protocol Corporate Accounting and Reporting Standard. <https://ghgprotocol.org/corporate-standard>. Accessed April 1, 2022.

verified, which is an optional step under the protocol. The Inventory is also intended to meet the requirements of Green Marine Annex 1-A, Calculation of GHG Emissions.⁵

Organizational boundary

Per the GGP, the term "organizational boundary" refers to the activities within the Port's legal and organizational structure. The 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. This includes the Port-owned airport, marina, marine terminal, administrative offices, public parks, and real estate holdings, and all staff employed by the Port.

Operational boundary

The term "operational boundary" defines the extent to which an entity has operational control over activities, and the extent to which the entity includes Scope 3 sources in its inventory. Quantifying Scope 1 and 2 emissions is mandatory and including Scope 3 sources is optional.

As discussed above, this Inventory includes Scope 1 and Scope 2 sources, and excludes Scope 3 courses. Scope 1 sources included are 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. The Scope 2 source included is purchased electricity used for Port-controlled buildings and operations.

GHGs included

The Inventory calculates emissions from the GHGs listed below. Other recognized GHGs are not included because they are not associated with the Port’s operations.

GHGs emitted from combustion of fossil fuels	GHGs emitted from air conditioning or refrigeration systems
Carbon dioxide (CO ₂)	Hydrofluorocarbons (HFCs)
Methane (CH ₄)	Perfluorocarbons (PFCs)
Nitrous oxide (N ₂ O)	

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.

Base year selection

The GGP calls for an entity to identify its base year, i.e., the year against which emissions are tracked over time. The Port has selected 2019 as the base year for its GHG accounting program. Due to the COVID-19 pandemic, 2019 is the most recent year representing the Port’s typical activity levels and emissions profile.

⁵ Green Marine. “Green Marine Annex 1-A, Calculation of GHG Emissions”, *Green Marine Self-Evaluation Guide – Ports & Seaway Corporations*, 2022.

Emission trends

To aid in tracking emissions, each year's GHG Calculator workbook includes information about emissions in the base year (2019) and each subsequent inventory (2020, 2021) to show the emissions profile over time.

Data sources

Relevant data on fuel and energy purchases were extracted from supplier invoices. The Port also provided information on fuel and energy sales to tenants, which were then subtracted from Port use. (For example, the Port charges for electricity used for boat moorage and web lockers; sells propane to marina tenants; and charges some building tenants for energy use when they are metered directly.)

Emission factors

Emission factors for each category came from published sources such as the US Environmental Protection Agency, The Climate Registry, and Puget Sound Energy (PSE), as detailed in the GHG Calculator workbooks. GHG emission factors for electrical use are derived from the specific mix of fuel sources that each utility uses to generate power. PSE provided utility-specific emission factors for each year in the Inventory, including its Green Power emission factor for 2021, when the Port began buying Green Power.

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. The workbook can also serve as a concise procedure on the inventory process, thus simplifying future inventory efforts and ensuring consistency in future inventories.

Limitations of the Inventory

The Inventory was developed to calculate the Port's Scope 1 and Scope 2 emissions for 2019-2021 based on available data and standard calculation methods, and within time and budget constraints. With this context in mind, several limitations of the Inventory are noted below.

Moorage electricity at Marine Terminal

The Port intended to exclude Scope 3 sources such as vessel moorage electricity. While the Port provided detailed records on moorage electricity at Cap Sante Marina, this information was not available for the Marine Terminal. (The Marine Terminal does not have shore power for larger vessels, but some smaller harbor craft can plug in to electricity when docked at Curtis Wharf.) As a result, the estimated GHG emissions for the Marine Terminal includes some portion of Scope 3 emissions.

Simplified estimation for gasoline and diesel emissions

A simplified estimation method was used to estimate CH₄ and N₂O emissions from gasoline and diesel use, which may be less accurate than direct calculation. Vehicle emissions of these two GHGs depend on a vehicle’s specific engine design, emission control system, and miles traveled. Rather than compiling vehicle-specific data, we applied a default ratio of CH₄ and N₂O to the corresponding fleetwide CO₂ emissions, per The Climate Registry’s simplified estimation method.⁶

Fugitive emissions of refrigerants

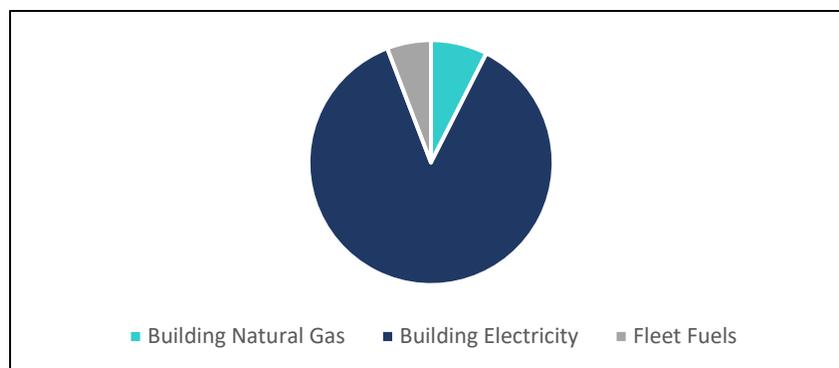
Emissions of HFCs and PFCs used in refrigeration and air conditioning systems in buildings and vehicles can result from leakage over the operational life of the equipment and disposal at the end of the useful life of equipment. Because HFCs and PFCs are very potent GHGs, seemingly small leaks could significantly affect Port-wide emissions. The Port’s Facilities Department reported that their records showed no air conditioning or refrigeration system leaks during the 2019-2021 period; thus, the GHG calculator for each year inventoried shows zero emissions from this source. However, if leakage occurs in the future, records on the specific gases and quantities will be needed to calculate emissions. Emission factors vary by refrigerant.

Inventory Results

2019 (Base Year) Emissions

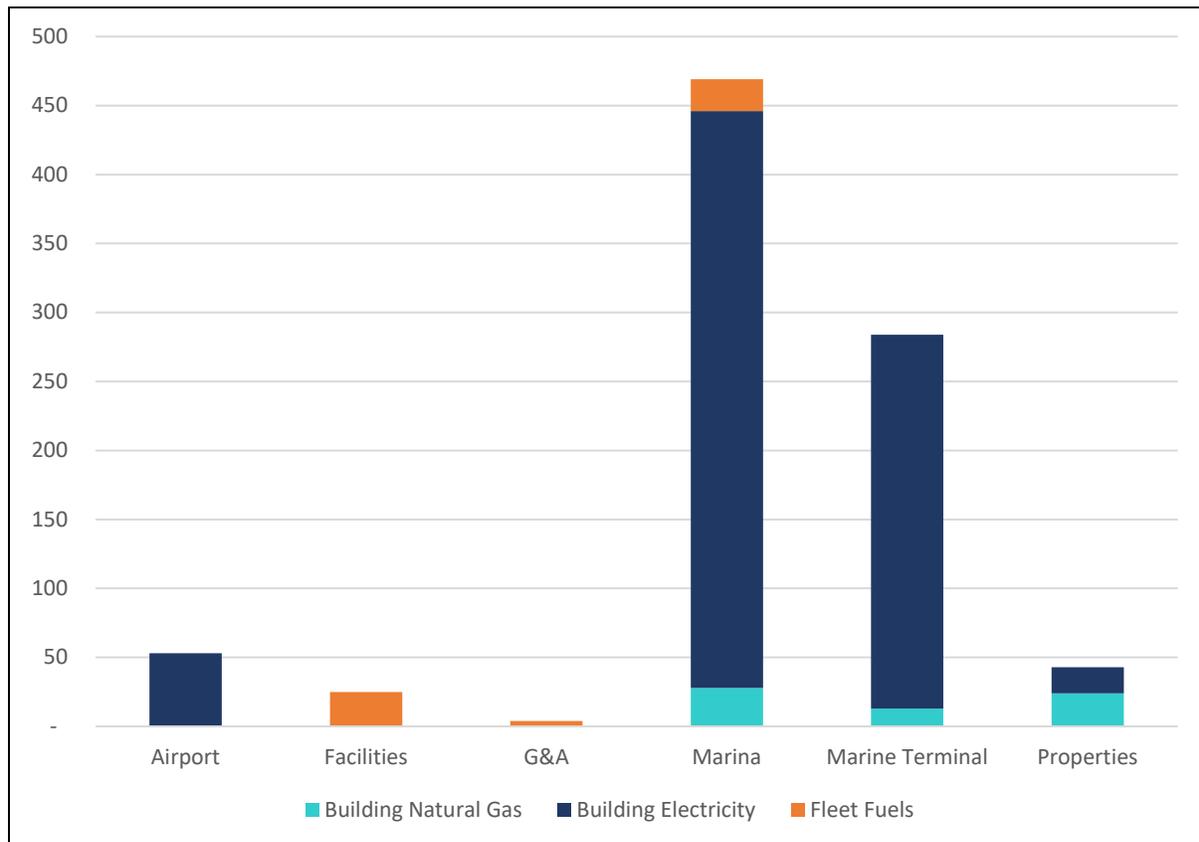
Port-wide GHG emissions in 2019 totaled 878 MT CO₂e. Electricity used in Port-controlled buildings was the dominant source of GHG emissions, accounting for 87% of total emissions. Natural gas in Port-controlled buildings made up 8% of total emissions, and fleet fuels represented 6% of the total. Looking at emissions by operational area, the Marina and Marine Terminal combined contributed 85% of Port-wide emissions. This was due to the relatively high electricity these two areas used. Also, PSE’s 2019 general fuel mix included a substantial portion of fossil fuels, resulting in high emissions per kilowatt-hour. See Figures 1 and 2, and Table 1, for more details.

Figure 1. Distribution of Port of Anacortes Base Year (2019) Scopes 1-2 GHG Emissions



⁶ The Climate Registry General Reporting Protocol. [General Reporting Protocol | The Climate Registry](#). Accessed April 1, 2022.

Figure 2. Port of Anacortes Base Year (2019) Scopes 1-2 GHG Emissions by Port Sector GHG in MT CO₂e



2020 Emissions

In 2020, Port-wide GHG emissions totaled 697 MT CO₂e, which is 21% lower than the 2019 total. This is mainly due to a 25% lower emission factor for PSE’s conventional electricity compared to 2019, based on a more favorable fuel mix that year. Electricity use was within 1% of the previous year, natural gas use decreased by 12%, and fleet use increased by 23%.

2021 Emissions

In 2021, Port-wide GHG emissions dropped to 292 MT CO₂e. Although electricity use was down 8% from base year levels, the main reason for the decline is that the Port began buying Green Power from PSE in April 2021. Green Power was sourced almost entirely from renewable energy and had an emission intensity that was 98% lower than that of the general fuel mix which was predominantly fossil fuels. The switch to Green Power reduced the Port’s 2021 emissions by 375 MT CO₂e.

Emission trends 2019-2021

Fuel and energy usage appeared stable over the 2019-2021 period, with an upward trend in gasoline and diesel use. Fuel and energy usage do not appear to have changed significantly during the COVID-19 pandemic. Some fluctuation in annual use of fuels and energy is expected based on varying weather conditions and Port activity levels.

While emission factors for natural gas and fleet fuels have remained constant, the emissions intensity of PSE’s electricity changes annually depending on the specific fuel mix used to generate electricity. More significantly, once the Port began buying Green Power in April 2021, its electricity-related emissions dropped dramatically, as shown in Figure 3.

Figure 3. 2019-2021 GHG Emissions from Port of Anacortes Scope 1 and Scope 2 Sources in MT CO₂e

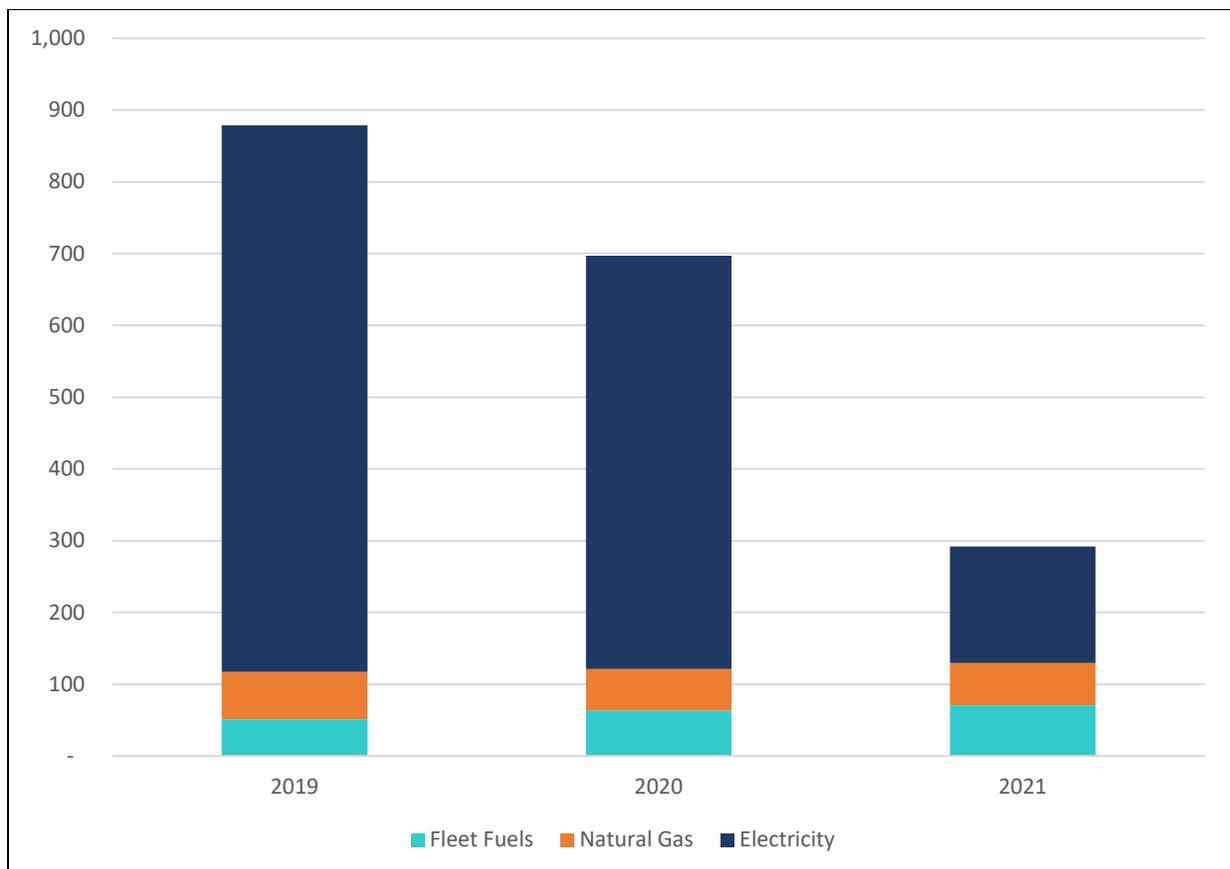


Table 1: Port of Anacortes GHG Inventory Results 2019-2021

SCOPE	SOURCE TYPE	SOURCE	EMISSIONS in MT CO ₂ e (a)		
			2019	2020	2021
1	Stationary	Natural Gas use in buildings	66	58	59
	Mobile	Gasoline use in fleet	39	49	55
		Diesel use in fleet	7	11	10
		Propane use in fleet	5	2	5
		Total Fleet Fuels	51	63	70
	Fugitive	Refrigerant releases	-	-	-
SCOPE 1 EMISSIONS			117	121	130
2	Indirect	Electricity use - general fuel mix	762	576	155
		Electricity use - Green Power (b)	-	-	7
		Total Electricity	762	576	162
SCOPE 2 EMISSIONS			762	576	162
TOTAL EMISSIONS			878	697	292

(a) Values reported in whole numbers; some totals do not add up exactly due to rounding.

(b) Port of Anacortes began buying Green Power from Puget Sound Energy in April 2021.

Recommendations for Overall GHG Accounting

Given the Port’s interest in conducting annual inventories, it is a good idea to integrate inventory practices into a holistic program. In addition to the GGP and Green Marine criteria, the U.S. Environmental Protection Agency provides guidance on an inventory management plan, defined as “an internal process for an organization to institutionalize the completion of a high-quality inventory.”⁷ Some key elements to include in your inventory management plan and/or future inventories are discussed below.

Base year adjustment policy

As the Port begins tracking emissions over time and conditions change, base year emissions may need to be recalculated. GHG inventories can be living documents; they may be updated to address significant errors, changes in calculation methodology, organizational changes such as acquisition, or addition of Scope 3 emission sources. The Port should set and document a policy threshold, e.g., 5% of total

⁷ United State Environmental Protection Agency Inventory Management Plan Guidance. [Inventory Management Plan Guidance | US EPA](#). Accessed April 1, 2022.

emissions, to define whether a change is significant enough to warrant recalculation of its base year emissions.

Emission trends

Future inventories should include information on the base year emissions and emissions from each subsequent inventory to provide the emissions profile over time. The GHG Calculator tool can be used to record each year's emissions as well as multi-year trends.

Example Base Year Adjustment Threshold

Port 2019 emissions = 878 MT CO₂e

5% threshold = 44 MT CO₂e

Emissions intensity metric(s)

The Port's current Inventory does not include an emissions intensity metric, which is not a standard element of an emissions inventory. However, Green Marine guidance calls for the inventory to include an emissions intensity metric, such as *tons of GHG per ton of cargo*, to allow comparisons in emission rates year over year. The Green Marine guidance allows ports to define alternate metrics or use absolute emissions if there is no suitable normalizer.

Due to the diversity of the Port's business lines (cargo, marina, airport, real estate) the metric *tons of GHG per ton of cargo* is not suitable to gauge Port-wide progress in reducing emissions. The Port has several options to meet this criterion: (1) use Port-wide absolute emissions as the metric; or (2) develop alternative metrics, such as activity-specific metrics for the Marine Terminal, which is the type of operation explicitly addressed by Green Marine. (This would require segregating emissions to allow metrics such as *tons of GHG per ton of cargo from the shipping terminal*.) The selected metrics should be identified in the GHG Calculator tool so that it is calculated each year.

Use of renewable energy certificates and carbon offsets

In 2021 the Port began buying electricity from PSE's Green Power program which offers renewable energy including wind, solar, biogas, and landfill gas.⁸ The Port's contract with PSE itemizes accounts to be included in the program. The contract should be updated whenever account information changes to ensure that all Port-controlled electricity is sourced from the Green Power program.

Per the GGP, future inventories should report on both the conventional (general fuel mix) electricity emissions and the market-based (Green Power) emissions, as shown in the 2021 GHG Calculator. (However, in tracking progress, the Port should use the market-based emissions from Green Power electricity.) The GGP also prescribes how instruments such as carbon offsets are addressed in GHG accounting. In general, gross emissions are reported separately from GHG offsets, and offsets purchased or developed outside of the inventory boundary are treated differently than those that are within the inventory boundary.

Data collection and management

The Port should evaluate on-going GHG inventory data needs and whether that data can be integrated into existing recordkeeping systems (e.g., when recording account-specific energy billing to tenants, or

⁸ Puget Sound Energy. Green Power Program. [PSE | Green Power Program - Solar, Wind, Hydro](#). Accessed August 15, 2022.

charges from suppliers, note the amount of energy used.) This may require new data collection and data management procedures involving staff outside of the Environmental team. It should also include a quality assurance process to ensure data accuracy. The Inventory Management Plan Guidance covers data management issues in more detail.

Auditing and verification

In lieu of third-party verification, the Port should consider an internal auditing process to verify the accuracy of future GHG inventories that are conducted in-house. Some organizations have internal financial auditors perform this work, for example.

Conclusions

The Port's GHG Inventory, developed using recognized GHG protocols, quantified Port-controlled emission sources for the years 2019-2021. The sources inventoried were natural gas used in Port-controlled buildings, electricity used in Port-controlled facilities, fuels used in the Port-owned fleet, and refrigerants used in air conditioning and refrigeration systems.

The Inventory established 2019 as the base year against which future GHG emissions will be tracked. In 2019, the Port generated approximately 878 MT CO₂e. Most of the emissions (87%) were generated from purchased electricity. The Marina and Marine Terminal collectively accounted for 85% of Port-wide emissions that year. From 2019 through 2021, the Port's energy and fuel usage fluctuated somewhat, but associated emissions declined significantly once the Port began sourcing PSE's Green Power for its electricity needs. The switch to Green Power in April 2021 reduced the Port's 2021 emissions by 375 MT CO₂e.

This memo also includes recommendations to meet the GGP and Green Marine guidance, streamline the Port's GHG accounting system, and promote consistency in future inventories. These suggestions include establishing a base year adjustment policy, identifying emission intensity metric(s) relevant to the Port's Green Marine membership, and improving data collection and management.

Lastly, the Inventory provides a solid foundation on which to build a climate action strategy. Now that Scope 1 and Scope 2 emissions have been quantified, the Port can target leading emission sources under its control and prioritize GHG reduction efforts. Emissions from Port-controlled electricity use have already been reduced through purchase of PSE's Green Power. The Port could further shrink its carbon footprint by phasing out natural gas systems in Port-controlled buildings, using drop-in renewable diesel, replacing fleet vehicles with electric-powered models, and promoting energy conservation. The Port has demonstrated its commitment to environmental sustainability by conducting the Inventory and is well on its way to a strong climate mitigation program.