SECTION 3 | STRATEGIES TO REDUCE IMPACTS: PORT MARITIME ADMINISTRATION

Port Maritime Administration Sectors Can Meet the 2030 GHG Reduction Target by Implementing 24 Strategies

The Port has control and/or can guide emissions reductions from **Port Maritime Administration** sources, especially from GHG Scopes 1 and 2 (building and campus energy, fleet vehicles and equipment). It can guide and influence Scope 3 sources (employee commuting and solid waste).

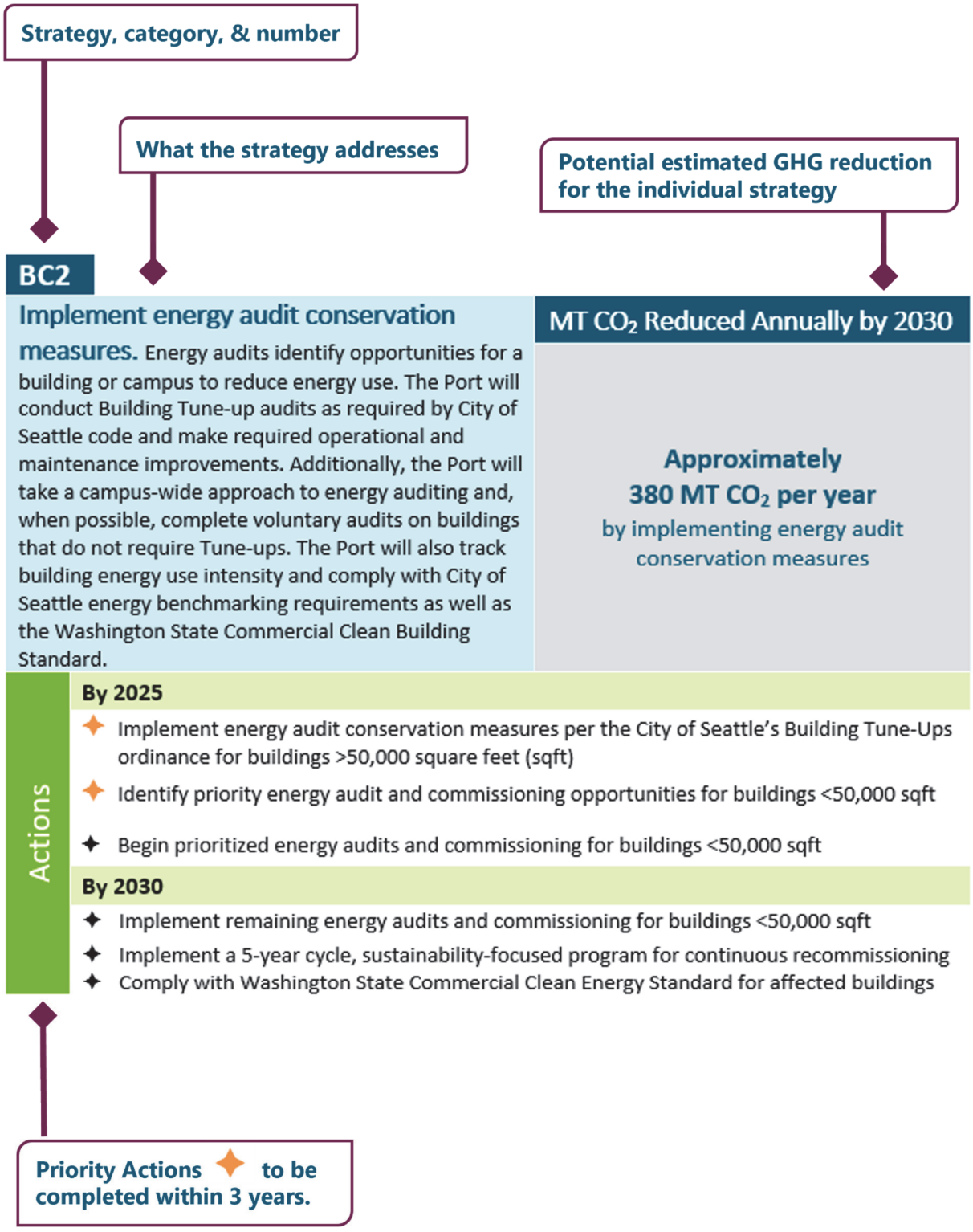
The action scenario identifies 23 strategies across five sectors that collectively can reduce Port Maritime Administration emissions by 2030 to half of their 2005 levels.

Because Seattle's electricity comes mainly from hydropower and will be fully renewable by 2045, the strategies lean heavily toward electrifying vehicles, equipment, and building systems, and moving away from fossil fuels and fossil natural gas.[19] In addition to electrification, strategies focus on maximizing use of renewable fuels in vehicles and renewable energy, including solar power which provides zero-emission power and reduces loads on the utility grid. Efficiency gains achieved through building retrofits, upgrades to building system controls, and replacing existing lighting with light emitting diode (LED) technology, among others, can further reduce emissions.

First steps toward deeper decarbonization must begin immediately since technologies to achieve net-zero energy buildings and zero-emission light-duty vehicles are rapidly becoming more available and affordable.

[19] The *Washington State Clean Energy Transformation Act* (E2SSB 5116, 2019) commits Washington state to provide an electricity supply free of GHG emissions by 2045.

How to Read the Sector Strategies That Follow



Building & Campus Energy

Strategies

BC1	Eliminate fossil natural gas use
BC2	Implement energy audit conservation measures
BC3	Install energy efficient lighting and controls
BC4	Reduce plug loads and upgrade building controls
BC5	Maximize use of renewable energy
BC6	Energy data management and planning
BC7	Apply high performance lease terms
BC8	Strengthen energy conservation communication and education

Emissions: Scopes 1, 2, and 3

3%

of Port Maritime GHG
2019 emissions

80

Buildings across 10 major campuses occupied by tenants and Port

Properties include marine terminals, commercial and recreational marinas, conference centers, offices, industrial facilities, warehouses, shops, restaurants, parking structures and public access parks. All campuses use electricity, and about half use natural gas.

BUILDING & CAMPUS ENERGY

Context

The Port has ten major Maritime campuses that include grain and cruise marine terminals, marinas, conference centers, offices, industrial facilities, warehouses, retail shops, restaurants, parking structures, and parks. All campuses use electricity, and seven use natural gas.

As a "landlord port," the Port holds a wide variety of lease types, some of which have long terms and limited opportunities for renewal or amendments. The Port owns and occupies land and buildings, and leases land and buildings to tenants. Port-managed properties are either occupied by Port staff and operations or may be leased directly to tenants but remain primarily under Port management. Port-managed properties allow the Port more control over implementing energy conservation measures. Tenant-managed properties include buildings or land leased by tenants from the Port or where the lease terms or agreements limit the Port's control and ability to implement energy conservation measures. In some cases, buildings are owned by tenants through ground leases and the Port may have no control over the building or operations whatsoever.

In addition to variation in control over property management, the Port also has a wide variety of utility meters and submeters throughout its buildings and facilities and complex relationships around how energy use and costs are distributed between the Port and its tenants. In some cases, direct energy use by tenants is not available or unknown and is therefore attributed to the Port, per GHG inventory protocol. This represents a gap in data accuracy in how emissions are allocated between scopes in the Port's annual inventories. Natural gas used in Port-owned buildings, and not metered and sold separately to tenants, is classified as a Scope 1 source. Purchased electricity used in Port-owned buildings, and not metered and sold separately to tenants, is classified as Scope 2. Natural gas and electricity purchased and metered directly to tenants for their use is classified as Scope 3.

Emissions from energy usage have varied from year to year but are not decreasing despite energy efficiency projects completed over this period. The upward trend is due to higher energy demand, especially for natural gas. GHG emissions have also fluctuated and are heavily influenced by the emission factor for electricity which changes annually based on Seattle City Light's portfolio mix. About 5 percent of the increase comes from refinements to GHG inventory data in recent years. Emissions from building and campus energy must be curtailed to help meet the Port's GHG goals, particularly its reduction targets for Scope 1 and Scope 2 emissions.

State and Local Energy Conservation Programs Applicable to the Port

Recognizing that buildings are a large and rapidly growing source of climate pollution, both Washington State and the City of Seattle have enacted regulations to promote energy efficiency in existing buildings as a quick, cost-effective way to cut GHG emissions.

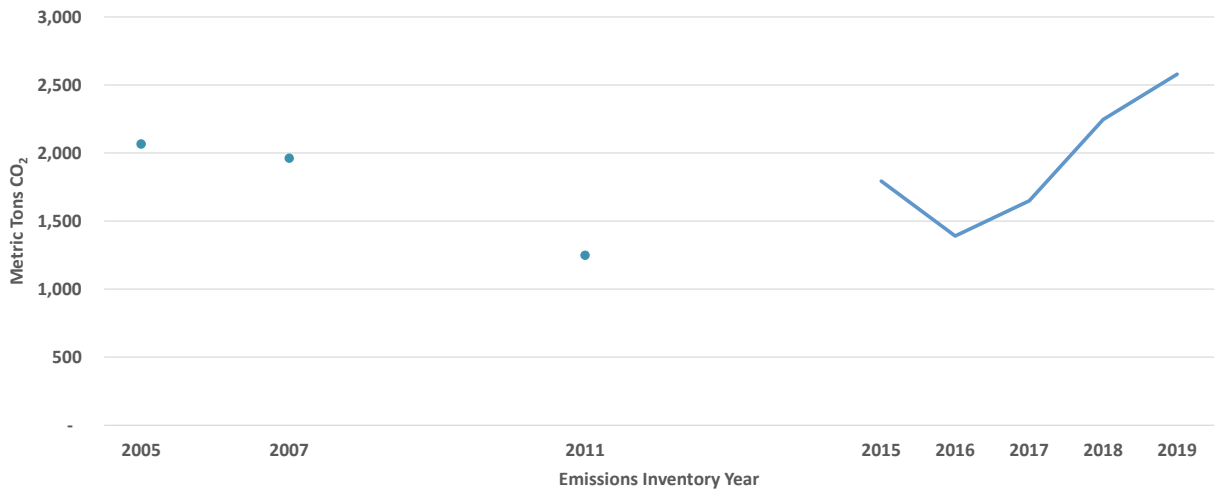
Washington State Commercial Clean Building Performance Standard (WAC 194-50)
Effective in 2020, developed energy use intensity targets for existing large commercial buildings (over 50,000 square feet), which will be updated over time to continually reduce GHG emissions from the building sector. Covered commercial buildings must comply beginning in 2026–2028, depending on size.

City of Seattle Energy Benchmarking Ordinance (SMC 22.920)
Requires owners of non-residential and multifamily buildings that are 20,000 square feet or larger to track energy performance and report annually to the City of Seattle. Each year the City publishes building energy performance data on the regulated buildings.

City of Seattle Building Tune-Ups Ordinance (SMC 22.930)
Requires an assessment of energy and water efficiency for commercial buildings 50,000 square feet or larger every five years. Through tune-ups, building owners find operational efficiencies and low- and no-cost fixes that improve building performance and on average reduce building energy use 10-15 percent.

Sources:
Clean Buildings Performance Standards - Washington State Department of Commerce
Energy Benchmarking - Environment | seattle.gov
Building Tune-Ups - Environment | seattle.gov

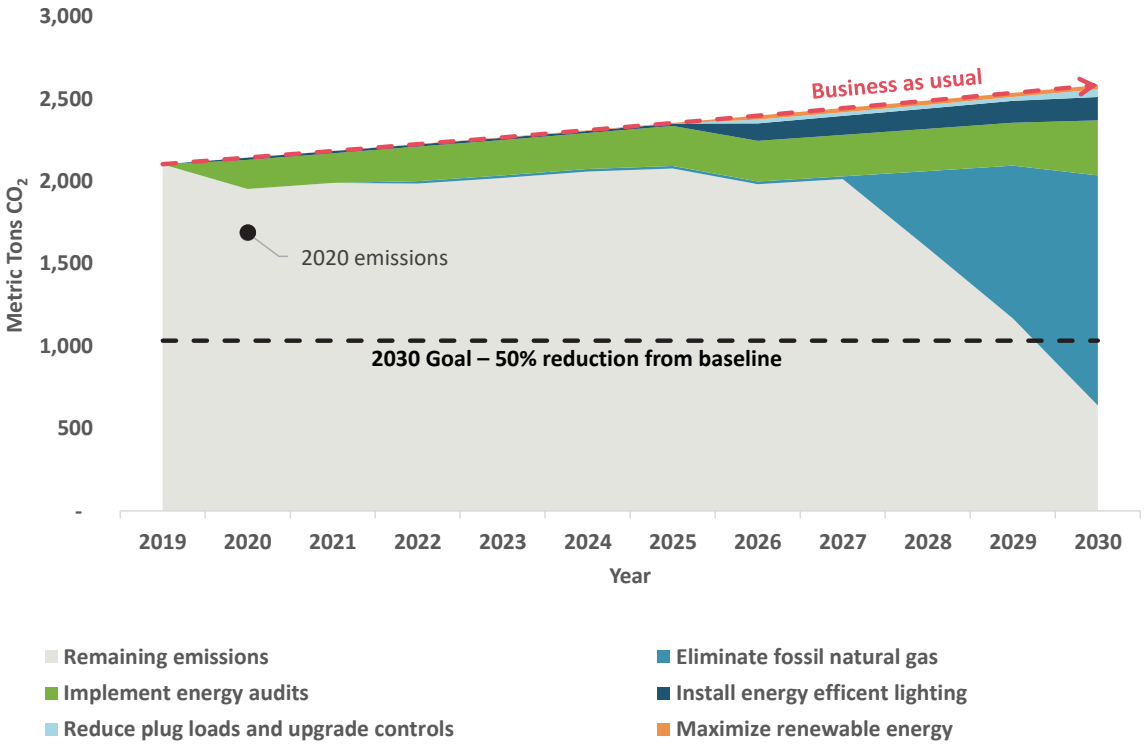
Figure 12. Annual GHG emissions from Building and Campus Energy



Emissions have trended upward in recent years.

Strategies to 2030

Figure 13. GHG reduction potential of Building and Campus Energy strategies to 2030



The strategies identified for this sector can reduce emissions from Building and Campus Energy by 50 percent from baseline, meeting the 2030 GHG reduction target. Emission data from the 2020 inventory was not used in the analysis.

BC1

Eliminate fossil natural gas use. HVAC systems are typically a building's largest source of energy use. HVAC and other natural gas systems like domestic hot water (DHW) heaters that reach the end of their useful life can be replaced with higher efficiency electric systems. Alternatively, use of renewable natural gas and other mechanisms can be used as transition strategies to reduce GHG emissions.

MT CO_2 Reduced Annually by 2030

Approximately
1,400 MT CO_2 per year
by maximizing use of high efficiency systems and renewable energy

Actions

By 2025

- Complete inventory of Port fossil natural gas systems
- Immediately discontinue installation of fossil natural gas systems for new construction and retrofits
- Complete asset planning for all Port-managed fossil natural gas system end-of-life replacements and upgrades
- Pursue electrification of Port-managed HVAC and DHW systems when cost and performance effective
- Install the highest efficiency electric or renewable energy-powered HVAC and DHW heating systems feasible in all retrofits and new construction
- Launch HVAC and DHW system replacement/upgrade program that supports tenants in implementing strategies that eliminate fossil natural gas emissions at tenant managed properties
- Evaluate alternative fuel sources such as renewable natural gas, and other pathways to eliminate fossil natural gas emissions

By 2030

- Complete the elimination of fossil natural gas in Port-managed properties
- Replace the fossil natural gas HVAC system at Pier 66, the Port's largest single user of natural gas across maritime campuses, with a high-efficiency, electric central plant
- Develop long-term plan to eliminate fossil natural gas at all Port properties by 2040

BC2

Implement energy audit conservation measures.

Energy audits identify opportunities for a building or campus to reduce energy use. The Port will conduct Building Tune-up audits as required by City of Seattle code and make required operational and maintenance improvements. Additionally, the Port will take a campus-wide approach to energy auditing and, when possible, complete voluntary audits on buildings that do not require Tune-ups. The Port will also track building energy use intensity and comply with City of Seattle energy benchmarking requirements as well as the Washington State Commercial Clean Building Standard.

MT CO_2 Reduced Annually by 2030

Approximately
380 MT CO_2 per year
by implementing energy audit conservation measures

Actions

By 2025

- ✦ Implement energy audit conservation measures per the City of Seattle's Building Tune-Ups ordinance for buildings >50,000 square feet (sqft)
- ✦ Identify priority energy audit and commissioning opportunities for buildings <50,000 sqft
- ✦ Begin prioritized energy audits and commissioning for buildings <50,000 sqft

By 2030

- ✦ Implement remaining energy audits and commissioning for buildings <50,000 sqft
- ✦ Implement a 5-year cycle, sustainability-focused program for continuous recommissioning
- ✦ Comply with Washington State Commercial Clean Energy Standard for affected buildings

BC3

Install energy efficient lighting and controls.

Lighting makes up a significant portion of the Port's overall energy load. Accelerating installation of high efficiency LED lamps and advanced lighting controls will conserve energy, reduce GHG emissions, utility costs, and maintenance. This strategy covers improvements that are independent of whole-building energy audits addressed in BC2.

MT CO_2 Reduced Annually by 2030

Approximately
200 MT CO_2 per year
through installation of high efficiency lighting and lighting controls

Actions

By 2025

- ✦ Complete lighting audits at all Port-managed buildings and campuses
- ✦ Identify high efficiency performance standards and specifications for lighting components and controls
- ✦ Complete 75 percent of LED lighting retrofits on Port-managed properties
- ✦ Audit lighting control functions and begin implementing smart lighting controls in Port-managed properties
- ✦ Launch a sustainable lighting program for Port tenants to support adoption of LED or high efficiency lighting and controls on tenant-managed properties

By 2030

- ✦ Complete 100 percent of LED lighting retrofits at all Port-managed and tenant-managed properties, leveraging the tenant sustainable lighting program
- ✦ Complete implementation of smart lighting controls at Port-managed properties

BC4

Reduce plug loads and upgrade building controls. DHW systems, lighting, HVAC systems, and plug loads (energy used by equipment plugged into outlets) are key elements of a building's overall power consumption. Audits and site assessments will identify opportunities to adjust control settings, upgrade or add controls, and reduce plug loads which will improve efficiency and reduce overall energy consumption.

MT CO_2 Reduced Annually by 2030

Approximately 70 MT CO_2 per year

by reducing plug loads and maximizing system controls

Actions

By 2025

- ✦ Audit select control systems and building equipment operational settings (focus on HVAC and DHW) in Port-managed buildings
- ✦ Evaluate and implement advanced controls upgrades and inclusion of variable speed motors, as feasible, when building systems are replaced, upgraded, or modified
- ✦ Evaluate plug load reduction opportunities in Port-managed buildings including equipment purchasing protocols, operational settings, and employee and tenant behavioral guidelines
- ✦ Implement plug load reduction opportunities in Port-managed buildings
- ✦ Launch a voluntary plug load and controls efficiency program for tenants

By 2030

- ✦ Continue implementing advanced controls upgrades in Port-managed buildings
- ✦ Continue implementing plug load reduction practices in Port-managed properties
- ✦ Evaluate opportunities to centralize building and campus system controls to streamline operations and maximize efficiency

BC5

Maximize use of renewable energy.

Renewable energy sources include wind, solar, geothermal, biomass, biofuels, renewable natural gas, renewable hydrogen, and wave, ocean, or tidal power. The Port will evaluate options to increase the use of renewable energy on a building-by-building basis and large-scale renewable energy projects or through renewable power purchase agreements.

MT CO_2 Reduced Annually by 2030

Approximately
40 MT CO_2 per year
by maximizing renewable energy use

Actions

By 2025

- ✦ Identify opportunities for new solar and other types of renewable energy generation both on- and off-site, prioritizing Port-managed properties
- ✦ Provide real-time solar energy monitoring and reporting for all Port-owned solar arrays
- ✦ Expand solar energy generation across Port-managed and leased properties, where feasible
- ✦ Evaluate a large-scale renewable energy and storage pilot project at a Port-managed or tenant-managed property
- ✦ Evaluate Power Purchase Agreements, off-site large-scale renewable opportunities, and utility renewable energy programs to minimize and eventually eliminate GHG from campus energy use

By 2030

- ✦ Transition to 100 percent use of clean electricity and renewable energy in Port-owned/leased facilities
- ✦ Implement a large-scale renewable energy and storage pilot project at a Port or tenant facility to maximize energy efficiency and increase resilience

Success Story: Solar Array Installation

The Port installed solar panels on a net shed at Fishermen's Terminal in 2017, rendering it a "net zero" energy building. In 2019, the Port installed a solar array on Pier 69, the Port headquarters building, that generates about 120,000 kilowatt-hours (kWh) of electricity annually and saves over $10,000 in annual energy costs. Pier 69's solar panels generate enough electricity to power nearly ten average American homes.

BC6

Energy data management and planning.

Accurate, readily available data on current and historical building and campus energy and fuel use is critical to make informed, sustainable investments and operational improvements. Effective energy data management will enable the Port to comply with regulatory requirements, identify opportunities to implement renewable energy and smart technologies, and track and communicate performance over time.

MT CO_2 Reduced Annually by 2030

No direct GHG reduction potential, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Complete utility meter and Port submeter inventory at all Port properties
- ✦ Implement energy data and asset management tools to enable Port-wide visibility on energy performance and evaluate building and campus energy performance, including metering changes to improve tracking of tenant-managed energy use
- ✦ Evaluate real-time energy management and reporting opportunities
- ✦ Develop smart meter deployment plan; collaborate with utilities to streamline collection of billing and energy use data
- ✦ Complete smart meter deployment to fill gaps in energy information
- ✦ Develop building and campus-specific master energy plans
- ✦ Evaluate opportunities to incorporate "smart building" technologies and the internet of things (IOT) into data management and planning processes

By 2030

- ✦ Integrate energy data and campus master energy plans into budget and asset management processes
- ✦ Implement building and campus-specific master energy plans at prioritized sites
- ✦ Implement smart building projects at select locations, as feasible

BC7

Apply high performance lease terms.

By incorporating energy efficiency elements into standard lease terms, the Port will promote energy efficiency updates and programs in tenant-managed buildings. (This is one element of Maritime Activity strategy XS2 – Leverage green lease terms.)

MT CO_2 Reduced Annually by 2030

No direct GHG reduction potential, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Conduct inventory of lease terms relevant to energy efficiency and conservation
- ✦ Evaluate opportunities to improve metering and data collection requirements to improve records of tenant energy use
- ✦ Incorporate high performance lease terms in all new and renewed leases
- ✦ Implement tenant engagement programs to support and encourage energy efficiency and conservation

By 2030

- ✦ Integrate Port building energy reduction strategies into tenant operations

BC8

Strengthen energy conservation communication and education. Frequent reporting on energy usage and energy efficiency projects will raise awareness among Port staff and tenants. Education can encourage behavior change to support energy efficient operations.

MT CO_2 Reduced Annually by 2030

No direct GHG reduction potential, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Establish employee-focused resource conservation program
- ✦ Provide reports and communications on building and campus energy performance for employees, leadership, and public
- ✦ Establish educational materials and engagement opportunities for employees and tenants

By 2030

- ✦ Sustain and improve communications, reporting, and education activities
- ✦ Measure and report on efficacy of employee and tenant engagement

Emissions Remaining after 2030

Strategies and actions above propose a path to achieve at least a 50 percent reduction in GHG emissions from 2005 levels to meet or exceed the Port's 2030 GHG reduction target. Per the emissions wedge analysis, the Building & Campus Energy sector will emit approximately 1,000 MT of GHG in 2030. These remaining emissions will need to be addressed to achieve the Port's longer-term GHG reduction goals through 2050 and the Northwest Ports Clean Air Strategy vision. Contributing sources of Building and Campus Energy emissions after 2030 include:

- Remaining fossil natural gas HVAC systems and natural gas used for cooking that are not scheduled for replacement or decarbonization by 2030 (Scope 1)
- Remaining electricity use after employing energy efficiency and renewable energy projects anticipated by 2030; electricity purchased from Seattle City Light that is not separately metered and sold to tenants (Scope 2)
- Electricity and remaining fossil natural gas use that is separately metered and sold to tenants (Scope 3)

100 Percent Clean Electricity in Washington by 2045

The Clean Energy Transformation Act (CETA) requires electric utilities in Washington state to offset carbon emissions by 2030 through and transition to clean, renewable, and non-emitting sources of electricity by 2045. Through CETA, emissions from purchased electricity will reach zero by 2045. Ahead of 2045, the Port may need to consider renewable power purchases or carbon offsets depending on Seattle City Light's energy mix.

Performance Metrics

Metrics	Targets / Objectives
Absolute GHG emissions from buildings and lighting	**2020 Strategy**: Absolute GHG emissions from buildings and lighting to be zero by 2050
Percent change in fossil natural gas use relative to 2005/2007 levels	
Percent change in electricity use relative to 2005/2007 levels	
Percent of total energy use (MMBtu) that is renewable energy	**Port of Seattle Century Agenda**: Meet all increased energy needs through conservation and renewable sources
kWh of renewable energy generated	
Annual change in Energy Use Intensity by building type for buildings over 20,000 sqft	

Fleet Vehicles & Equipment

Strategies

FV1	Use drop-in renewable fuels
FV2	Deploy electric vehicle charging across Port waterfront properties
FV3	Transition to electric vehicles
FV4	Right-size vehicles and fleet
FV5	Use technology to gather data and improve efficiency
FV6	Educate Port drivers on eco-driving and fleet use practices

Emissions: Scope 1

1%

of Port Maritime GHG 2019 emissions

400

Maritime fleet vehicles and equipment assets

Roughly two-thirds of the fleet is powered by gasoline, and one-third by diesel. Assets include 30+ hybrid electric vehicles and equipment (e.g., forklifts and carts) powered by electricity or propane.

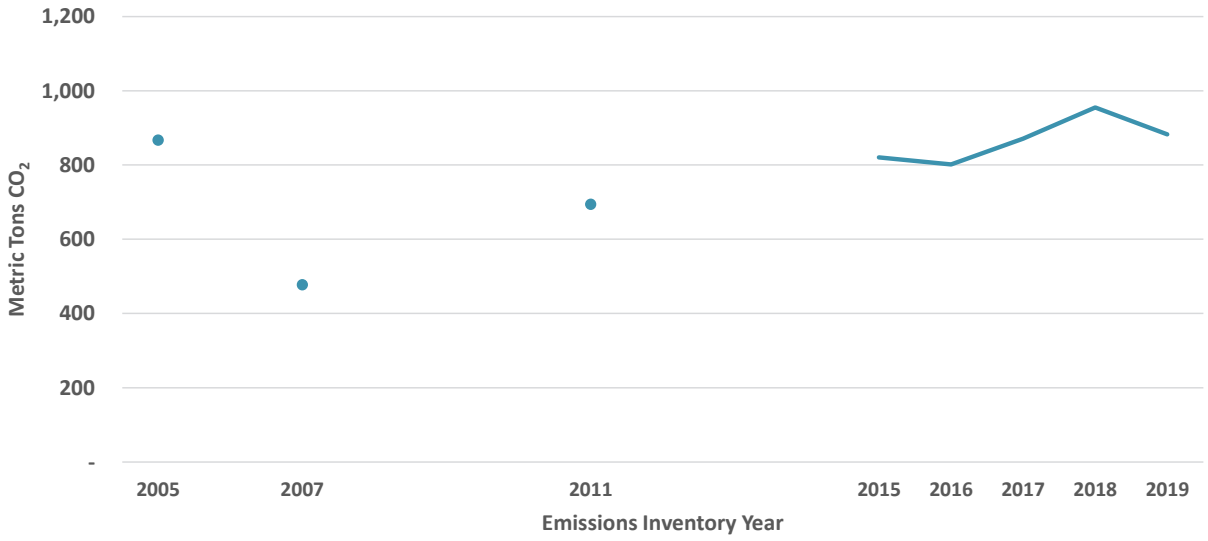
FLEET VEHICLES & EQUIPMENT

Context

The Port's fleet includes cars, vans, trucks, specialized heavy-duty equipment, small boats, and cargo-handling equipment. Roughly two-thirds of the fleet is powered by gasoline, and one-third by diesel. Assets include about 30 hybrid electric vehicles and equipment units (e.g., forklifts and carts) powered by electricity or propane.

The fleet's fuel use and associated GHG emissions have not declined since 2005. Fuel use has varied from year to year, generally trending upward since 2015. Growth in gasoline use accounts for most of the increased emissions. The demand for diesel fuel, used in larger trucks and heavy equipment, has not decreased, but diesel emissions per gallon have declined as the Port replaced fossil diesel with bio-based blends and renewable diesel. Recognizing the need to address emissions from fleet vehicles, in 2019 the Port developed sustainable fleet recommendations to reduce fleet emissions.

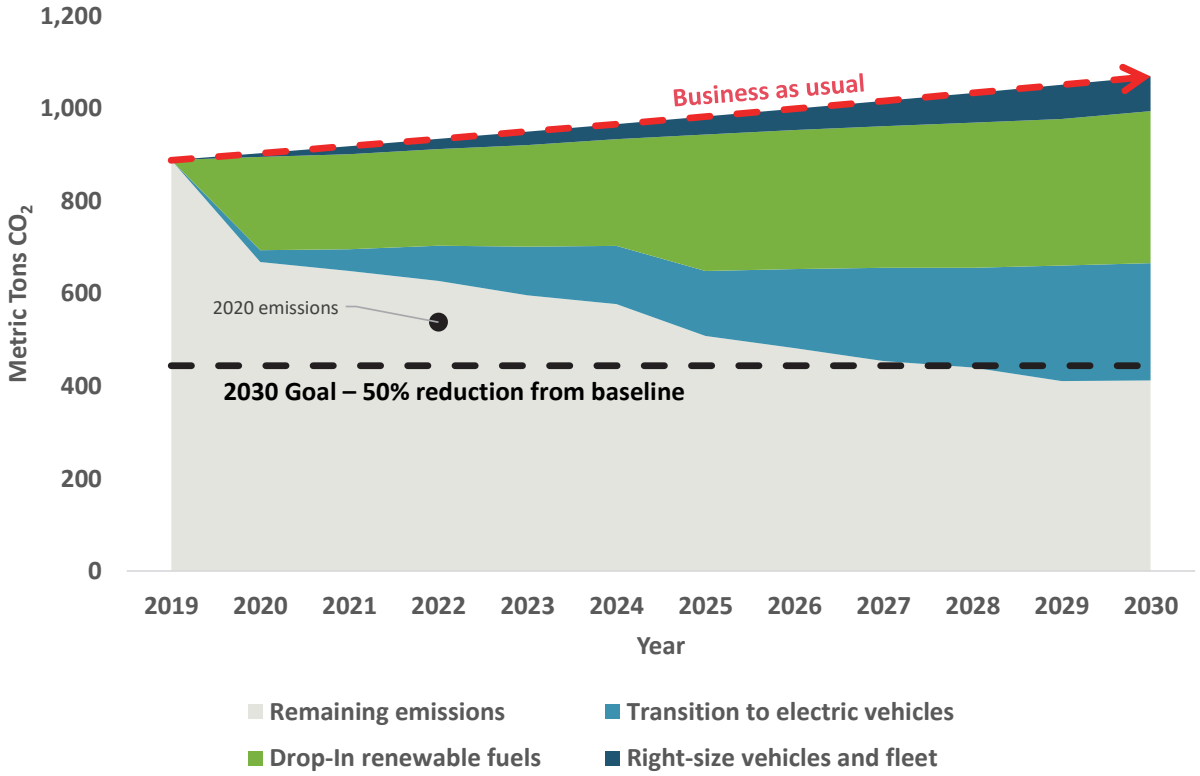
Figure 14. Annual GHG emissions from Fleet Vehicles and Equipment



Emissions have trended upward in recent years.

Strategies to 2030

Figure 15. 2030 GHG emission reduction potential of Fleet Vehicle and Equipment strategies



Strategies this sector can reduce emissions from Fleet Vehicles and Equipment by 50 percent from baseline, meeting the 2030 GHG reduction target. Emission data from the 2020 inventory was not used in the analysis.

FV1

Use drop-in renewable fuels. The Port fleet can achieve immediate emission reductions by switching to drop-in renewable fuels, which are non-petroleum-based fuels like renewable diesel and renewable gasoline, made from sources such as waste cooking oil, grease, tallow, or other renewable feedstocks. A drop-in renewable fuel is lower carbon compared to fossil diesel or gasoline and does not require engine modifications. Because renewable diesel is more readily available than renewable gasoline, the Port will focus on renewable diesel in the near-term for diesel vehicles that fuel onsite. Passage of a low carbon fuel standard in Washington will increase the availability of low carbon fuels and drive cost parity between these fuels and conventional fossil fuels.

MT CO_2 Reduced Annually by 2030

Approximately
300 MT CO_2 per year
by switching to drop-in renewable fuels

Actions

By 2025

- Dispense renewable diesel at the Port's fleet fueling stations
- Expand use of renewable fuels as a fossil fuel replacement, such as renewable gasoline
- Evaluate employee fuel purchase card use and encourage on-site fueling at Port fueling stations that dispense renewable fuels

By 2030

- Continue to evaluate and expand use of new, lower carbon renewable fuel sources

Success Story: Use Renewable Diesel

In 2008, the Port replaced diesel dispensed on-site with less-carbon intensive biodiesel (B20) and replaced some gasoline powered vehicles with hybrid sedans and SUVs. In December 2019, the Port began piloting the use of renewable diesel (RD99) for on-site diesel fueling. With the same molecular makeup as petroleum diesel, renewable diesel is made from non-petroleum renewable resources such as agricultural waste products, oils, or fats. Renewable diesel can be used in diesel vehicles and equipment without engine modifications, does not emit new carbon emissions into the atmosphere, and can reduce air pollution.

FV2

Deploy electric vehicle (EV) charging across Port waterfront properties. Installing charging stations across Port waterfront properties is a critical step toward reducing air and GHG emissions through the electrification of Port fleet vehicles. A coordinated approach is needed to ensure that charging installations are designed to meet fleet operational needs into the future and to accelerate investment in charging infrastructure as a first step to widespread electrification of fleet vehicles.

MT CO_2 Reduced Annually by 2030
Critical to other efforts

Actions

By 2025

- ✦ Complete installation of Level 2 charging stations at the Marine Maintenance South Yard
- ✦ Develop an EV readiness plan to expand EV charging stations across Port waterfront properties, in coordination with the SWCES and other energy studies
- ✦ Establish an EV infrastructure charging program

By 2030

- ✦ Complete installation of EV charging sites at key locations across Port maritime properties

FV3

Transition to electric vehicles. Replacing fossil fuel vehicles with electric vehicles at the end of their useful life can reduce fuel use while providing an emission reduction benefit. Vehicle electrification will focus first on light-duty vehicles where electric models are available or are anticipated in the next few years. Fleet managers will continue to monitor and evaluate the development of electric or hybrid-electric technology for trucks, heavy duty vehicles and specialized equipment.

MT CO_2 Reduced Annually by 2030
Approximately 250 MT CO_2 per year by replacing traditional fleet vehicles with electric models

Actions

By 2025

- ✦ Begin fleet asset conversions to EVs, prioritizing sedans and sport utility vehicles
- ✦ Pilot use of non-sedan EVs and equipment, including electric light-duty trucks and vans, and electric outboard engines for small workboats
- ✦ Track technology developments in heavy-duty EVs and equipment and identify opportunities to electrify Port-owned diesel equipment (e.g., heavy forklifts) at Fishermen's Terminal, Maritime Industrial Center, and Terminal 91

By 2030

- ✦ Replace all fleet sedans and sport utility vehicles with EVs
- ✦ Expand vehicle electrification efforts to include light trucks and vans
- ✦ Pilot heavy-duty electric vehicles, as relevant to Port fleet applications

FV4

Right-size vehicles and fleet. The Port's fleet includes some older, under-utilized vehicles. Right-sizing can be applied by replacing older vehicles with newer, more fuel-efficient models, by eliminating under-utilized vehicles from the fleet, and by pooling vehicles to maximize use per asset.

MT CO_2 Reduced Annually by 2030

Approximately 75 MT CO_2 per year by right-sizing vehicles

Actions

By 2025

- ✦ Assign lifecycle limits to vehicle types and classes and accelerate replacement of past-due assets
- ✦ Implement asset selector list for fleet managers to standardize and right-size new vehicle purchases
- ✦ Centralize the Pier 69 vehicle pool to increase utilization ad retire older vehicles
- ✦ Maximize vehicle utilization with expanded pooling of vehicles and equipment, reducing 1:1 vehicle assignment, and optimizing pool size

By 2030

- ✦ Manage fleet within useful life cycle limits and maximize

FV5

Use technology to gather data and improve efficiency. Fleet technology, such as telematics and other software, will enable the right-sizing process. Technology will make existing vehicles more efficient by limiting engine idling and providing data on how vehicles operate, including speed, location, and fueling events. Anti-idling technology is available for most vehicle types.

MT CO_2 Reduced Annually by 2030

GHG reduction potential is low, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Pilot telematics on a portion of the fleet
- ✦ Implement new fleet management software
- ✦ Expand telematics to all appropriate assets
- ✦ Install anti-idling technology on targeted assets with high idle uses
- ✦ Use motor pool software and hardware to manage pools for efficiency
- ✦ Incorporate telematics data into fleet management approaches to optimize utilization and maintenance

By 2030

- ✦ Update fleet data management software and capabilities
- ✦ Leverage data to inform fleet management decisions

Success Story: Electric Vehicle Charging Stations

The Port has installed electric vehicle charging stations at Fishermen's Terminal and Shilshole Bay Marina, and additional stations are planned. The stations give travelers, customers, tenants, and employees the ability to charge their vehicle while visiting port-owned locations.

FV6

Educate Port drivers on eco-driving and fleet use practices. As new types of vehicles enter the fleet, including electric vehicles, drivers must be trained to operate them safely and sustainably. Telematics data can be used to target specific training needs. Staff will be informed of new right-sizing guidance on motor pool use.

MT CO_2 Reduced Annually by 2030
GHG reduction potential is low, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Incorporate eco-driver training into Port employee training modules, including how to charge and drive electric fleet vehicles
- ✦ Establish outreach program for sustainable driver education
- ✦ Use telematics to target training topics and needs
- ✦ Provide department-specific driver training focused on specific vehicle types and use cases
- ✦ Continue employee and public engagement on sustainable fleet issues

By 2030

- ✦ Measure and report on efficacy of ongoing driver training
- ✦ Continue educating port drivers and equipment operators on how to drive and charge electric fleet vehicles

Emissions Remaining after 2030

Strategies and actions above propose a path to achieve at least a 50 percent reduction in GHG emissions from 2005 levels to meet or exceed the Port's 2030 GHG reduction target. Per the emissions wedge analysis, the Fleet & Vehicle Equipment sector will emit approximately 400 MT of GHG in 2030. These remaining emissions will need to be addressed to achieve the Port's longer-term GHG reduction goals through 2050. Continuing sources of Fleet & Vehicle Equipment emissions after 2030 include:

- Fossil-based diesel and gasoline purchased off-site as needed
- Remaining fossil fuel content of fuels used in medium- and heavy-duty vehicles and equipment not yet scheduled for replacement[20]

[20] "Fossil fuel content" refers to the fossil portion of renewable diesel or gasoline fuel blends.

Performance Metrics

Metrics	Targets / Objectives
Percent of light-duty passenger fleet vehicles that are zero-emissions or use renewable fuels	**2020 Strategy:** 100 percent of light-duty passenger fleet vehicles are zero-emissions or use renewable fuels by 2030; 100 percent of entire fleet is zero-emission by 2050
Percent of liquid and gaseous fuel purchased that is renewable	
Percent of entire fleet (including all vehicles, equipment, and vessels) that is zero-emission	

Employee Commuting

Strategies

EC1	Flexible work arrangements
EC2	Update employee commute benefits
EC3	Expand employee communication and enhance education as new opportunities emerge to expand lower-emission commute options
EC4	Continue to advocate for more accessible multimodal transportation options for Port Maritime worksites

Emissions: Scope 3

2%

of Port Maritime GHG 2019 emissions

53% Of commutes made while driving alone

20% City's target "Drive Alone Rate" for the Belltown neighborhood

Pier 69 is required to have a commute trip reduction plan to keep commuting routes moving and reduce carbon emissions per the Washington State Commute Trip Reduction law. The Port offers a wide range of commuter benefits, but is not currently achieving commute trip reduction targets.

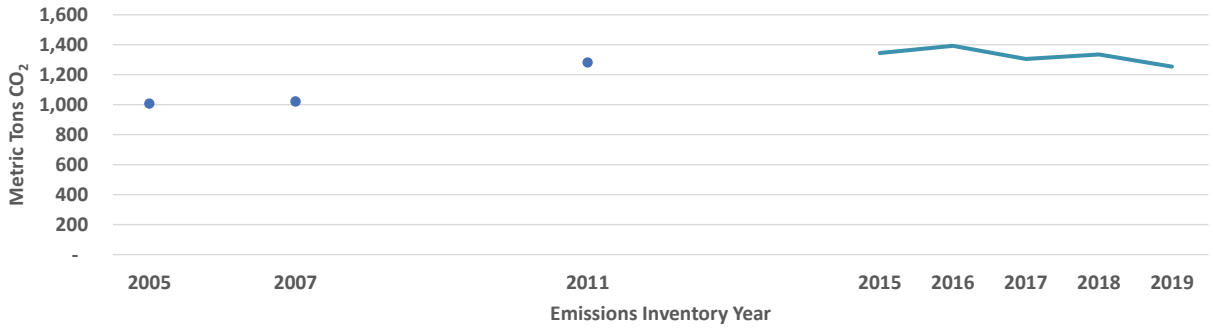
EMPLOYEE COMMUTING

Context

To comply with a statewide Commute Trip Reduction (CTR) program administered by Washington State Department of Transportation (WSDOT), the Port conducts an employee commuting survey every two years for work locations with 100 or more employees. The Port's Pier 69 headquarters is the only Port maritime building to date covered by this Plan that meets the WSDOT CTR threshold.

The Pier 69 drive alone rate in 2019—54 percent—remained relatively stable compared to previous CTR surveys. However, the rate is well above the drive alone target for commute trips within Belltown/Denny Triangle, where Pier 69 is located. This target decreased to 20 percent in the City of Seattle's 2019-2023 Strategic Plan. A significant decline in drive alone trips is needed to meet the city target and reduce employee commuting emissions.

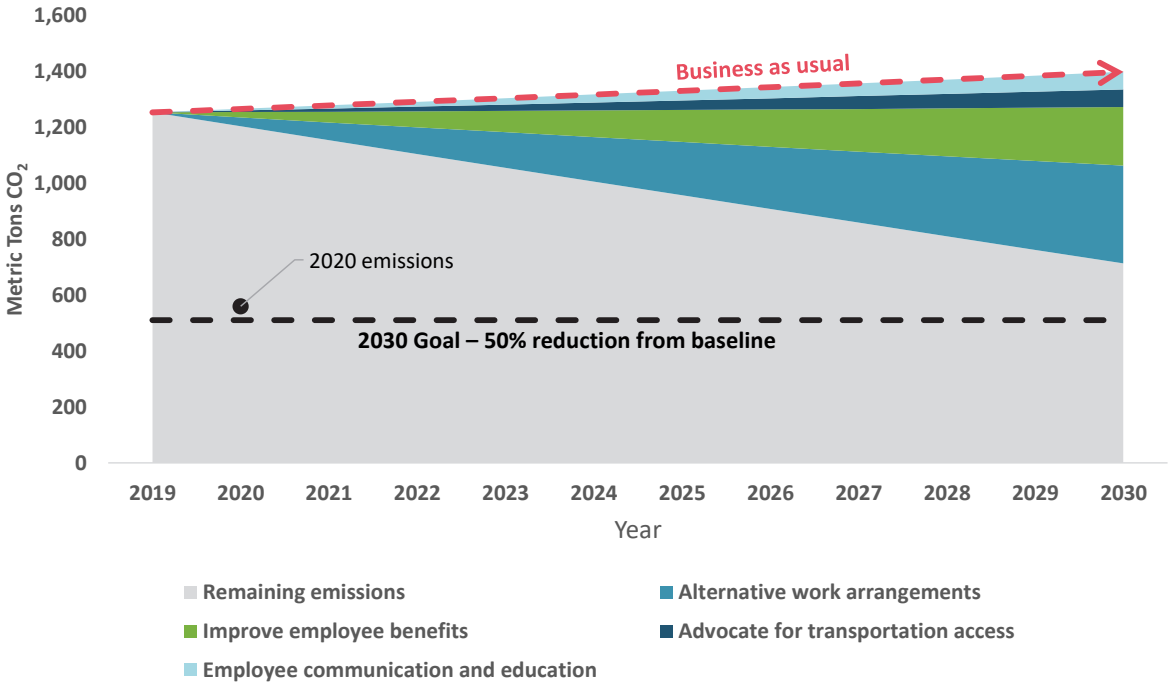
Figure 16. Annual GHG emissions from Employee Commuting



Emissions have trended downward in recent years.

Strategies to 2030

Figure 17. 2030 GHG emission reduction potential of Employee Commuting strategies



The strategies identified for this sector will reduce GHG emissions, but the employee commuting sector will not independently achieve the 2030 reduction target. Emission data from the 2020 inventory was not used in the analysis.

EC1

Flexible work arrangements. Flexible work arrangements include teleworking or compressed work weeks to reduce the number of days employees must commute to work. Flexible work arrangements are the most direct way to reduce GHG emissions from commute trips by reducing the number of commute trips taken.

MT CO_2 Reduced Annually by 2030

Approximately 220 MT CO_2 per year
by maximizing various alternative work arrangements

Actions

By 2025

- ✦ Identify options to encourage the use of telework and compressed work weeks
- ✦ On an annual basis, evaluate options for providing financial support to teleworking employees who use home office equipment
- ✦ Improve tracking of flexible work arrangements and set target participation levels
- ✦ Continue monitoring utilization of flexible work arrangements and adjust as warranted
- ✦ Evaluate need and options to provide financial support to teleworking employees on an on-going basis

By 2030

- ✦ Continue regular monitoring and enhancement of alternative work week policies

EC2

Update employee commute benefits as new opportunities emerge to expand lower-emission commute options.

A comprehensive commute benefits program can improve employee recruitment and retention, minimize commute stress, and make lower-emission commuting choices more attractive. While the Port offers several commute benefits, like subsidized transit passes, the provision of free parking near work locations remains a barrier to reducing emissions in this sector. Expanding commuter benefits for alternative modes of transport, which could include enhanced first and last mile connections to transit stops, subsidized vanpool and bikeshare, or organized carpooling could expand employee commute options.

MT CO_2 Reduced Annually by 2030

Approximately
130 MT CO_2 per year
by improving benefits that encourage use of mass transit options

Actions

By 2025

- ✦ Incorporate the Port's GHG reduction goals into the Employee Commuter Benefits Strategic Plan under development in 2020
- ✦ Identify and assess options for gathering and analyzing employee commute pattern data to support future program decisions
- ✦ Implement an Employee Commuter Benefits Strategic Plan to systematically assess the current Employee Commuter Benefits Program against program goals, identify gaps in the program, and identify, analyze, and recommend potential enhancements to the program
- ✦ Assess potential impacts of a revised employee parking benefit on employee engagement, retention, attraction, and commuting preferences

By 2030

- ✦ Reassess and refresh the Port Employee Commuter Benefits program on an ongoing basis

Success Story: Commuter Benefits

The Port offers a wide range of employee commuter benefits including bike storage and showers; heavily subsidized transit passes; a guaranteed ride home; vanpool and van share subsidies; and flexible work arrangements including telework, flextime, and compressed work week options for some employees with management approval.

EC3

Expand communication and enhance employee education about commute options beyond driving alone. Employees need to be aware of the Port's commuter benefits to take advantage of commute options beyond driving alone. Communication can clarify available programs, highlight management support for employee participation, and market key services that support lower-emission commuting.

MT CO_2 Reduced Annually by 2030

Approximately
40 MT CO_2 per year
through enhanced employee education and communication

Actions

By 2025

- Develop and implement an employee education and promotion program to educate employees about commuting options and how to utilize them
- Review and identify opportunities to enhance employee onboarding and new employee orientation information and materials to include the Employee Commuter Benefits Program and how it aligns with Port values and goals

By 2030

- Review and adjust employee education and promotion programs about commute options to maintain relevance and effectiveness
- Continue to maintain and update employee onboarding and new employee orientation information regarding the Employee Commuter Benefits Program

EC4

Continue to advocate for more accessible multi-modal transportation options for Port Maritime worksites. The Port's control over commute options is limited to employee benefits and offering infrastructure on Port property. To secure transportation options beyond driving, coordination with regional transportation agencies is needed. The Port has struggled to increase use of transit specifically as waterfront construction has pushed transit stops further away from the Port's Seattle headquarters at Pier 69 in recent years. Ensuring safe, connected, and accessible multi-modal infrastructure through the region is critical to improve access to Port locations.

MT CO_2 Reduced Annually by 2030

Approximately
40 MT CO_2 per year
through improved access to mass transit options

Actions

By 2025

- Continue advocating for safer and more accessible multi-modal transportation access to Pier 69 and other work sites with local transit and transportation agencies (Seattle Department of Transportation, King County Metro, and Sound Transit)

By 2030

- Continue advocating for safer and more accessible multi-modal transportation access with local transit and transportation agencies

Emissions Remaining after 2030

The strategies and actions above propose a path to achieve approximately 30 percent reduction in GHG emissions from 2007 levels as part of the Port's effort to meet or exceed the 2030 GHG reduction target. Per the emissions wedge analysis, the Employee Commuting sector will emit approximately 714 MT of GHG in 2030. These remaining emissions will need to be addressed to achieve the Port's longer-term GHG reduction goals through 2050. Continuing sources of energy emissions after 2030 include:

- Remaining trips made by single occupancy vehicles that are not zero-emission
- Remaining trips made via other travel modes that are not zero-emission

Performance Metrics

Metrics	Targets / Objectives
Drive alone rate at CTR-affected worksite (Pier 69)	Continuous improvement
Percent of employees utilizing telework or flexible work arrangements at CTR-affected worksite (Pier 69)	

Solid Waste

Strategies

SW1	Maximize diversion of common recyclable and organic materials
SW2	Minimize solid waste generation
SW3	Expand specialized items recycling
SW4	Enhance communication and education with employees and tenants

Emissions: Scope 3

< 1%

of Port Maritime GHG 2019 emissions

1,300 Tons of garbage generated by the Port and Port tenants in 2019

1,100 Tons of material diverted 2019, yielding a waste diversion rate of 45%

Nearly 70% of the waste is generated at Shilshole Bay Marina and Fishermen's Terminal. Both campuses are occupied by tenants and open to the public. The Port has influence, but not direct control, over waste disposal at these sites.

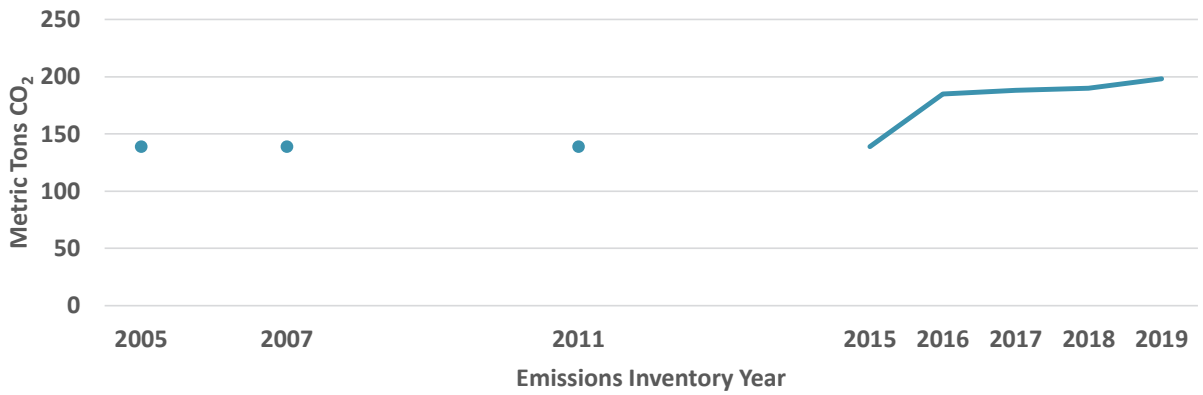
SOLID WASTE

Context

This sector includes solid waste generated at Port Maritime campuses, which is the focus of the Port's Maritime Solid Waste Management Plan. Nearly 70 percent of the waste is generated at Shilshole Bay Marina and Fishermen's Terminal—two large sites that are occupied by tenants and open to the public. The Port aims to divert 60 percent of materials from the waste stream through recycling or composting. In 2019, 45 percent of materials was diverted.

Historical data on solid waste volumes and GHG reductions is limited. Since tracking began in 2015, GHG emissions from solid waste landfilling have increased each year. The data below does not include construction waste generated by contractors which is tracked separately on a project-specific basis.

Figure 18. Annual GHG emissions from Solid Waste



Emissions have trended upward in recent years.

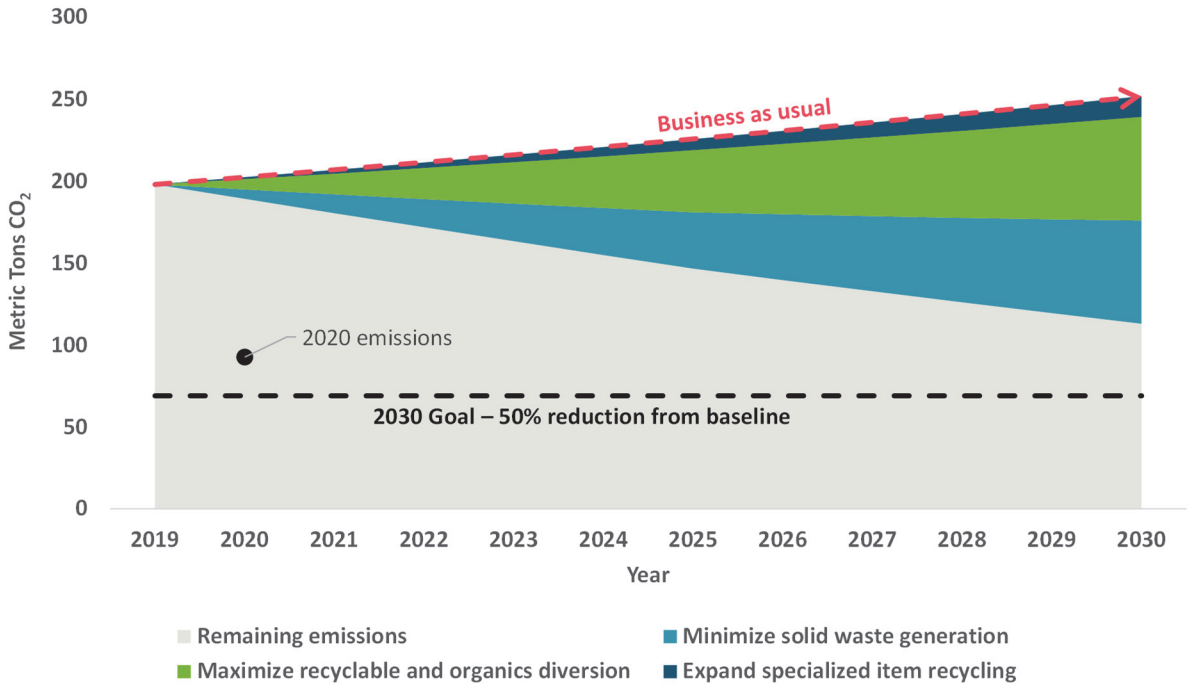
Success Story: Solid Waste Management

To reduce garbage volumes and GHG emissions, the Port implemented a Maritime Solid Waste Management Plan in 2016 that has improved solid waste practices.

- Improved waste collection systems, signage, education, and event guidelines to ensure that City of Seattle recycling ordinances are followed
- Conducted waste audits at over half of the Port's maritime campuses
- Developed site-specific implementation plans with tenant and staff input for Marine Maintenance, and Shilshole Bay Marina.

Strategies to 2030

Figure 19. 2030 GHG emission reduction potential of Solid Waste strategies



The strategies identified for this sector are from the Port Maritime Waste Reduction Plan and will reduce GHG emissions, but the solid waste sector will not independently achieve the 2030 reduction target. Emission data from the 2020 inventory was not used in the analysis.

SW1

Maximize diversion of common recyclable and organic materials. Garbage service in Seattle includes recycling of paper, cardboard, plastics, glass, and metal, and composting of organics, compostable packaging, and plant material. Waste audits will be conducted on a 3-year cycle to assess proper waste disposal. The Port will work with staff and tenants to identify and address diversion barriers (e.g., proper sorting of recyclables and organics) and develop site-specific waste reduction plans.

MT CO_2 Reduced Annually by 2030
Approximately 60 MT CO_2 per year by maximizing common recyclable and organics diversion

Actions

By 2025

- ✦ Complete first round of waste audits at all Port campuses
- ✦ Develop and implement facility-specific waste reduction plans
- ✦ Re-audit each site every three years
- ✦ Update facility-specific waste reduction plans every three years

By 2030

- ✦ Continue to re-audit each site every 3 years
- ✦ Continue to update facility-specific waste reduction plans every 3 years

SW2

Minimize solid waste generation. In addition to recycling and composting practices, other waste minimization practices are needed to reduce the amount of waste produced each year. Updating the Port's purchasing practices increasing focus on sustainability is a critical first step.

MT CO_2 Reduced Annually by 2030
Approximately 60 MT CO_2 per year by minimizing amount of total waste generated at the Port

Actions

By 2025

- ✦ Update the Port's environmental purchasing policy and procedures
- ✦ Evaluate internal Port department practices for materials management and reuse
- ✦ Evaluate waste reduction and reuse opportunities from industry-specific waste streams (e.g., restaurants, fishing nets)
- ✦ Monitor waste generation for all Port-controlled sites
- ✦ Develop a metric for tracking environmental purchasing policy success

By 2030

- ✦ Integrate circular economy approaches into Port policies and practices to extend the lifecycle of products

SW3

Expand specialized items recycling. Waste audits will identify specialized items that are potentially recyclable but are not accepted by the City's recycling program. Examples include scrap metals, building materials, electronics, and furniture. Customized recycling programs can be added for these items when feasible.

MT CO_2 Reduced Annually by 2030
Approximately 15 MT CO_2 per year through expansion of recycling for special items (e.g., batteries)

Actions

By 2025

- ✦ Identify specialized items with recycling needs via waste audits
- ✦ Begin tracking specialized waste items

By 2030

- ✦ Continue to evaluate waste audits for additional specialized items that can be recycled

SW4

Enhance communication and education with employees and tenants. Targeted communications and education will increase general awareness of waste management and provide clear instructions for employees and tenant on proper waste sorting.

MT CO_2 Reduced Annually by 2030
GHG reduction potential is low, but strategy is critical to support other efforts

Actions

By 2025

- ✦ Develop new solid waste training module for employees using the Port's internal online Learning Management System
- ✦ Train new employees, and provide updates to all employees at least annually regarding waste minimization and recycling and composting efforts
- ✦ Engage with tenants to widen the impact of the Port's recycling and composting efforts

By 2030

- ✦ Continue training program for staff
- ✦ Continue tenant engagement to widen the impact of the Port's waste minimization efforts

Emissions Remaining after 2030

The strategies and actions above propose a path to reduce GHG emissions from solid waste, but this sector will not independently achieve the 2030 reduction target. Per the emissions wedge analysis, the Solid Waste sector will emit over 100 MT of GHG in 2030. These remaining emissions will need to be addressed to achieve the Port's longer-term GHG reduction goals through 2050. Continuing sources of emissions after 2030 include:

- Remaining solid waste after advanced waste reduction, recycling, and composting practices are put into place

Performance Metrics

Metrics	Targets / Objectives
Percent change in absolute waste tonnage relative to 2007 level	Continuous improvement
Percent of solid waste tonnage recycled or composted	

Habitat Restoration & Carbon Sequestration

Strategies

HR1 Complete Smith Cove Blue Carbon Benefits Study

HR2 Continue shoreline restoration projects

212 Acres of freshwater, estuarine, and marine habitat in the Green-Duwamish and Puget Sound watersheds that the Port has enhanced or restored

Habitat restoration provides ecosystem benefits by supporting native plants and animals, and community benefits such as public shoreline access. Habitat restoration can also "sequester" or capture carbon from air and water—helping the Port work toward its carbon-neutral goal.

HABITAT RESTORATION & CARBON SEQUESTRATION

Context

As part of the Port's Century Agenda, the Port set an objective to restore, create, and enhance 40 additional acres of habitat in the Green/Duwamish Watershed and Elliott Bay. Numerous habitat restoration and monitoring projects are in progress, both small and large, including up to 11 acres of riparian and marsh restoration to be completed in 2021. Native riparian and aquatic plants create important habitat for fish and wildlife. Restoration projects bring back these critical habitats and the natural resource values they offer, such as promoting salmon recovery. In addition, these restored habitats sequester carbon from the atmosphere and dissolved carbon from the aquatic environment.

Habitat restoration is included in this Plan as part of a long-term, holistic approach to emission reduction. The Port does not currently quantify the atmospheric carbon sequestration of restored riparian and marsh habitat and has not included habitat-related carbon sequestration in measuring progress toward its GHG reduction goals or to offset GHG emissions from other sources. However, the carbon capture benefits may be quantifiable in future years, to contribute to the Port's net-zero carbon goals. If global emissions continue to increase, carbon sequestration strategies such as those described below will become critical measures to address climate change.

Strategies to 2030

HR1

Complete Smith Cove Blue Carbon Benefits Study. The Port launched a "blue carbon" pilot study at Smith Cove in 2018 by planting oyster shells, kelp, and eelgrass in a 23-acre plot. The Port will continue to monitor the test plot, quantify carbon captures, and apply lessons learned to other areas.

MT CO_2 Reduced Annually by 2030
Not quantified

Actions

By 2025

- ✦ Continue to investigate referred methods for blue carbon in Smith Cove based on results of test plots and initial installation of kelp, eelgrass, shellfish
- ✦ Continue to plan for restoration of native riparian habitat to complement the Smith Cove blue carbon benefits
- ✦ Add interpretive signage to future Smith Cove Park to raise awareness of the project
- ✦ Continue long-term monitoring and evaluation, including evaluation of changes to water chemistry, biomass, and habitat functions
- ✦ Capture lessons learned and identify opportunities to scale this project to other areas

By 2030

- ✦ Incorporate larger-scale blue carbon habitat components in existing and planned restoration projects depending on results of Smith Cove Blue Carbon Benefits Study

Success Story: Smith Cove Blue Carbon Pilot Project

The Smith Cove Blue Carbon Pilot Project is exploring the idea of "blue carbon" – CO_2 captured and stored in ocean and nearshore habitats. Kelp, eelgrass, and marsh plants are important elements of the blue carbon habitat in Elliott Bay. They remove carbon from seawater as they grow, storing it in the plants and sediments.

HR2

Continue shoreline restoration projects. The Port will map shoreline areas and landcover along 15 miles of shoreline. The Port will also complete construction of two additional shoreline parks and begin to quantify the carbon capture capacity of restored native riparian and aquatic plants at these sites.

MT CO_2 Reduced Annually by 2030
Not quantified

Actions

By 2025

- Evaluate shoreline areas and landcover along 15 miles of shoreline managed by the Port's Maritime Division and Economic Development Division
- Continue to advance a Multi-Site Mitigation Bank through regulatory entitlement process
- Complete construction of the shoreline habitat restoration and public shoreline access at the Duwamish River People's Park (formerly T117) and quantify anticipated carbon sequestration benefit
- Complete construction of the Park and Shoreline Habitat restoration project (formerly 8th Ave South Street End) and quantify anticipated carbon sequestration benefit
- Continue to evaluate feasibility of candidate sites for habitat restoration, including blue carbon components

By 2030

- Design and construct the 34-acre Auburn Wetlands habitat restoration project and quantify anticipated carbon sequestration benefits

Success Story: Alternative Bankline Stabilization Program

Seawalls and rocks were historically used to keep shorelines from eroding in Elliott Bay and the Duwamish Waterway. These features create carbon-poor environments that are not ideal for optimal fish and wildlife habitat function. The Port's Alternative Bankline Stabilization Program will identify opportunities to convert "hard armoring" on the shorelines to greener, carbon-rich areas. The program will use anchored large-wood, plant-based erosion control materials, recycled soil, and native plants to stabilize the banklines while creating habitat and capturing carbon.

Success Story: Floating Wetlands

Partnering with the University of Washington, the Port has installed several floating wetland units in the Duwamish River and at Fishermen's Terminal. A floating wetland island is a raft packed with dense wetland plantings. They are used in areas where space limitations prevent conventional restoration methods. These units will provide fish and wildlife habitat while also taking up contaminants from the water column.

Performance Metrics

Metrics	Targets / Objectives
Number of acres of habitat restored (Port-wide)	**Port of Seattle Century Agenda:** Restore, create, and enhance 40 additional acres of habitat in the Green/Duwamish habitat