Port of Bellingham Climate Action Strategy

August 1, 2023

Prepared for the Port of Bellingham by Triangle Associates

PORT OF BELLINGHAM
Washington State

TRIANGLE

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List of Definitions and Acronyms

Definitions

Action – a task, activity, or event needed to fulfill a strategy.

Adaptation or Climate Adaptation – refers to adjusting behavior and altering systems to better withstand current and future impacts of climate change.

Adaptive Capacity – the ability of an asset to respond or adjust to external risks associated with climate change and coastal hazards.

Adaptive Management – a decision process that promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood.

Exposure – the presence of people, infrastructure, natural systems, and economic, cultural, and social resources (i.e., assets) in areas that are at risk from climate change and associated coastal hazards.

Goal – a statement of a policy objective that specifies the desired outcome.

Mitigation – refers to efforts to reduce or prevent emission of greenhouse gases.

Port-controlled assets are either occupied and controlled by Port staff/operations or leased directly to tenants but remain primarily under Port management.

Resilience or Climate Resilience – the ability of a system, such as a community, organization, or natural environment, to respond to, recover from, or adapt to a disturbance or change related to climate change or extreme weather.

Sensitivity – the degree to which an asset is impacted from climate change and associated coastal hazards.

Strategy – the approach used to achieve a goal.

Target – the overarching goal to build resilience to the impacts of climate change.

Tenant-controlled assets are leased by tenants or have a lease which limits the Port's control and ability to implement resiliency measures.

Vulnerability – the propensity or predisposition of assets to be adversely affected by hazards. The result of combining exposure, sensitivity, and adaptive capacity.

Acronyms

CAS	Climate Action Strategy
COB	City of Bellingham
CoSMoS	U.S. Geological Survey's Coastal Storm Modeling System
ESA	Exposure, Sensitivity and Adaptive Capacity
CHE	Cargo-Handling Equipment
DHW	Domestic Hot Water
EV	Electric Vehicles
GHG	Greenhouse Gases
HVAC	Heating, Ventilation, and Air Conditioning
ICE	Internal Combustion Engine
JCAT	Joint Climate Action Team (includes Port of Bellingham, City of Bellingham and Whatcom County)
SLR	Sea Level Rise
RSLR	Relative Sea Level Rise
UW	University of Washington
VMT	Vehicle Miles Travelled
WTA	Whatcom Transportation Authority
WWU	Western Washington University

Executive Summary

In 2018, the Port of Bellingham began an ambitious effort to better understand its contributions to and responsibilities regarding climate change. The 2019 Roadmap to a Climate Action Plan (Roadmap) laid out a multi-year, step-by-step process to develop a Climate Action Strategy to accomplish two specific goals: 1) reduce the Port's greenhouse gas emissions and 2) protect Port infrastructure by building resilience to sea level rise (SLR) and storm surges.

Work to develop the Climate Action Strategy began in 2019 and was led by Triangle Associates (formerly Veda Environmental) with support from EA Engineering, Science and Technology, Peak Sustainability Group, and Cogent Environmental Consulting. Together, the team worked with Port staff to:

- Articulate a common vision for the Port's role in addressing climate change.
- Collaborate with key regional partners and stakeholders to ensure alignment with other relevant climate plans and efforts.
- Complete a 2019 Greenhouse Gas Inventory to serve as a baseline for measuring emissions reductions.
- Complete a Vulnerability Assessment to determine the Port's specific vulnerabilities to sea level rise and storm surges.
- Develop and test a detailed methodology to analyze the vulnerability of specific Port infrastructure.

Photo: Bellingham Shipping Terminal Mur logs.
Source: Port of Bellingham

Among the key findings of the greenhouse gas inventory and Vulnerability Assessment, key pieces of technical work that informed this Strategy, include:

- In 2019, the Port of Bellingham's emissions totaled 5,687 metric tons of carbon di-oxide equivalent, or CO_2e, with buildings and energy supply contributing the most emissions.
- According to the University of Washington Climate Impacts Group Interactive Sea Level Rise Data Visualizations by 2050, there is a 17% chance of relative sea level rise (RSLR) increasing by .9 feet and a 1% chance of it increasing by 1.4 ft.
- Four areas of the Port that are highly vulnerable and at most risk of flooding include:
    - Squalicum Parkway Industrial Area
    - Bellingham Shipping Terminal Area
    - Marine Trades Area by the I & J Waterway
    - The Fairhaven Marine Industrial Park

The Climate Action Strategy identifies specific targets to reduce the Port's emissions and build resilience to protect Port assets. It also describes 10 goals and 35 specific strategies needed to achieve the goals and targets. A high-level summary follows.

Squalicum Harbor.
Source: Port of Bellingham

GOALS TO ACHIEVE TARGETS			
Emissions Reduction Target: The Port of Bellingham aims to achieve a reduction of Port-controlled GHG emissions of at least 90% from 2019 levels by 2030 and 100% from 2019 levels by 2050.		**Resiliency Target:** The Port of Bellingham anticipates, prepares for, and effectively responds to the impacts of climate change and collaborates with regional partners to protect and enhance the economy, community, and the environment through Port-wide resilience programming efforts.	
1	Significantly reduce GHG emissions from Port-controlled energy supply and buildings.	7	Institutionalize and prioritize climate change resilience across all Port divisions, processes, investments, and operations.
2	Reduce GHG emissions from Port-controlled fleet vehicles, vessels, and equipment.	8	Increase the resilience of Port infrastructure to changing climatic conditions.
3	Reduce emissions associated with Port employee commutes.	9	Support a local economy that is built upon sustainable practices and is resilient to climate change impacts.
4	Monitor the Port's progress toward meeting GHG reduction targets.	10	Protect and enhance the health of Port employees, tenants, and other facility users in the face of changing climatic conditions.
5	Reduce GHG emissions from all Port tenant-controlled buildings and energy supply.		
6	Encourage reduction of emissions associated with tenant vehicles, vessels, and equipment.		

By adopting the Climate Action Strategy (Strategy), the Port of Bellingham positions itself as a leader among mid-sized ports in proactively mitigating and building resilience to the effects of climate change. It will join the ranks of a small number of ports in Washington that have adopted climate action plans and strategies, marking a significant step in its path towards achieving its stated climate targets.

The Strategy will serve as a guiding document that supports the Port's overall mission and regional identity. Achieving the targets and goals of reducing emissions and building resilience to climate change hazards will ensure the Port's continued role as an economic engine for Whatcom County. The contents of the Strategy will give clear direction and vision to Port Commissioners, staff, and key partners by helping guide decision-making.

By pursuing the goals and strategies included in this Climate Action Strategy, the Port can take meaningful action to reduce its GHG emissions and to help mitigate climate change while building its resilience to climate change impacts.

Implementation of the Strategy will affect all aspects of the Port's operations and will need to align with other related plans and processes. It must extensively engage stakeholders and partners to continue building buy-in and support, as well as pulling in partners to advance actions.

Finally, the Strategy will ensure that the Port is aligned with regional governments that have taken steps to develop similar plans, including WWU, the City of Bellingham, Whatcom County, the Whatcom Transportation Authority, the Lummi Nation, and the Nooksack Indian Tribe. This work, especially the extensive, recent efforts by the City of Bellingham and Whatcom County, informed the Port's own Strategy. However, the Port's Strategy reflects its unique role within the community as a driver of economic development and job growth. This Strategy provides the Port an opportunity to define a clear, visionary path to a sustainable economic and environmental future.

Section 1. Introduction

Background and Purpose

From the North Cascades Mountains to Puget Sound and the Salish Sea, the climate of northwestern Washington is changing. Records show that average temperature throughout the year are warmer, heat waves are more frequent, and precipitation events are more extreme in the spring, fall, and winter, while summers are getting drier (Cascadia Consulting Group, 2020). Additionally, sea levels are rising and coastal storms are intensifying, presenting significant challenges for coastal communities like Bellingham. These changes are consistent with climate change, or the long-term shifts in temperatures and weather patterns driven largely by human activities.

The effects of climate change in the Puget Sound region continue to threaten the economy and way of life for millions of citizens. Addressing these impacts, which include flooding from rising sea levels and storm surges, higher temperatures, and ocean acidification, will fall largely on the shoulders of local and regional governments, including the Port of Bellingham (Port).

Climate Change 101

Since the mid-19th century, human activities including burning fossil fuels (like coal, oil, and gas) have resulted in a significant increase in the atmospheric concentrations of greenhouse gases (GHGs). GHGs, including carbon dioxide, methane, nitrous oxide, water vapor and fluorinated gases, trap heat in the Earth's atmosphere and cause the planet to warm, a process known as the greenhouse effect. While the greenhouse effect is necessary to life as we know it on Earth, the increase in atmospheric GHG concentrations caused by human activities is causing a rapid increase in global temperatures, resulting in sea level rise and extreme, difficult-to-predict weather patterns. Climate change and its impacts are expected to become more extreme in the future, with far-reaching consequences for human communities and the natural world.

In 2018, the Port, acknowledging the unprecedented challenges posed by climate change and the consequences of non-action, adopted the Roadmap to a Climate Action Plan (Roadmap) (EcoNorthwest, 2019). The Roadmap set a clear course for the Port to develop and adopt a comprehensive climate action strategy to reduce greenhouse gas (GHG) emissions and build resilience to climate change.

About the Port of Bellingham

The Port of Bellingham (the Port), located in Whatcom County, Washington, is a special purpose municipal corporation engaged in a variety of business operations including marine and aviation, community and economy, administration, and land management. The Port operates approximately 300 acres of tideland and 1,600 acres of land in Blaine, Bellingham, and unincorporated Whatcom County. The Port's marina operations support private and public boats, commercial fishing operations, and serve as a main passageway between the U.S. and Canada.

The Port's main mission is to fulfill the essential transportation and economic development needs of the region, while providing leadership in maintaining Whatcom County's overall economic vitality through the development of comprehensive facilities, programs, and services. The Port contributes approximately 10% of Whatcom County's economic activity through its various businesses (Port of Bellingham, 2022).

Source: Port of Bellingham

Based on recommendations set forth in the Roadmap, the Port took steps to create this Climate Action Strategy (CAS or Strategy). The Strategy provides a detailed and strategic framework for the Port to measure, plan for, and reduce GHG emissions and build resilience to climate change hazards while supporting the Port's overall mission and regional identity. It includes specific targets, goals, and strategies that the Port can pursue to ensure its continued role as an economic engine for Whatcom County.

Moving forward, the Strategy will help guide the Port's decision-making around climate change topics and daily operations. It will provide Port commissioners, staff, and key partners with a common vision and clear direction. It will also ensure that the Port is aligned with other governments and organizations within the County that have made their own climate action commitments, including the City of Bellingham, Whatcom County, the Lummi Nation, the Nooksack Tribe, Whatcom Transportation Authority, and Western Washington University (WWU). The Port's Strategy simultaneously builds on the efforts of these regional partners while reflecting its unique role within the community as a driver of economic development and job growth.

The Strategy is an important local climate planning document not only for the Port,

but for Whatcom County as a whole. It defines a clear, visionary path to a sustainable economic future for the Port and the surrounding area, promotes a healthy natural environment, supports collaborative climate action with surrounding jurisdictions, and serves as a model for other local organizations and governments looking to take climate action. It also positions the Port as a leader among Washington State ports, as it is one of only a handful of the 66 ports to have completed a climate action plan as of 2023.

Scope and Organization

The Climate Action Strategy focuses on two related but stand-alone issues. First, the Strategy addresses the issue of greenhouse gas emissions and identifies opportunities for the Port to reduce its emissions. Second, it addresses the issue of threats that climate change hazards pose to Port infrastructure and operations and highlights opportunities to build the Port's resilience to those impacts.

The Port of Bellingham Climate Action Strategy:

- Supports the Port's mission to promote sustainable economic development, optimize transportation gateways, and build on information previously developed for the Port.
- Reflects knowledge of staff and stakeholders regarding climate change and sustainability.
- Reflects the best available data, science and information relevant to the Port.
- Provides clear, transparent project information to increase awareness among partners and stakeholders in preparation for climate change impacts.
- Supports the Port's identity as a local economic driver.
- Includes outcomes that are achievable and measurable.

The following pages of the Strategy are organized around these two main topics as follows:

- **Section 2. Addressing Greenhouse Gas Emissions:** This section provides an overview of local GHG emissions, summarizes the purpose of quantifying emissions, and identifies the Port's GHG emissions reduction targets. It summarizes the key findings from the Port's 2019 Greenhouse Gas Inventory (the 2019 Inventory), discusses its scope and limitations (e.g., it specifically excluded aviation-related operations associ-

ated with the Bellingham International Airport and tenant operations[1]); and identifies opportunities to further refine the 2019 Inventory. Finally, this section identifies recommended GHG emission reduction goals and strategies for the Port to pursue in the short-, medium-, and long-term.

The Climate Action Strategy positions the Port as a leader among Washington State ports, as it is one of only a handful of the 66 ports to have completed a climate action plan as of 2023.

- **Section 3. Building Resilience to Climate Change Impacts:** This section provides an overview of local climate change impacts and opportunities to build the Port's resilience to those impacts. It summarizes key findings from the Port of Bellingham Coastal Vulnerability Assessment (the Vulnerability Assessment), discusses its scope and limitations (e.g., it is primarily focused on impacts to Port operations from coastal storms and sea level rise), and identifies opportunities to further refine the Vulnerability Assessment. This section also identifies additional key climate change hazards that are expected to impact the Port's operations (e.g., changing weather patterns, flooding, coastal erosion/sedimentation, wildfires and air quality, extreme temperatures, and ocean acidification) as well as primary vulnerabilities associated with these hazards. Finally, this section identifies climate change resilience-building goals and strategies for the Port to pursue in the short-, medium-, and long-term.
- **Section 4. Port Economic Development Opportunities for Energy Transition and Supporting Innovation:** This section discusses opportunities for economic development associated with climate action.
- **Section 5. Collaboration Opportunities:** This section highlights opportunities for the Port to collaborate with other local entities to further local climate action goals.
- **Section 6. Implementation, Tracking, and Reporting:** This section details an approach for the Port to implement, track progress and report on, and update this Strategy.

1 Per GHG Inventory Protocols, each organization has leeway in deciding which Scope 3 sources are relevant for inclusion in its inventory.

Dockside market. Source: Port of Bellingham

Approach and Methodology

The Strategy was developed by a consultant team led by Triangle Associates (formerly Veda Environmental) and comprised of EA Engineering, Science and Technology, Peak Sustainability Group, and Cogent Environmental Consulting. Together, these firms provided expertise on the topics of GHG emissions, sea level rise, vulnerability assessments, policy and program development, key partner and community engagement and communications, strategic and organizational planning and development, and technical writing.

The overall process by which the Strategy was developed is summarized below. Throughout the process, the team engaged internal and external stakeholders to ensure understanding of and support for the work (see Key Partner and Community Engagement Section).

2020

STEP 1

Held a Visioning Workshop to engage Port staff in articulating a common vision for the Port's role in addressing climate change.

2021

STEP 2

Reviewed extensive background materials and documents including (but not limited to):

- Port of Bellingham Roadmap to a Climate Action Plan (2019).
- Climate Action Plans for regional partners including Whatcom County, City of Bellingham, Lummi Nation and WWU.
- Climate Action Plans for other Washington ports including Port of Seattle, Port of Vancouver (WA), and Port of Tacoma.
- Whatcom County Hazard Mitigation Plan.
- Best Available Science (e.g., U.S. Geological Survey's Coastal Storm Modeling System model, also referred to as "CoSMoS").

Relevant Port planning documents including but not limited to:

- Comprehensive Scheme for Harbor Improvements (2016).
- Waterfront District Subarea Plan.
- Annual Strategic Budget.

STEP 3

Completed a 2019 Greenhouse Gas Inventory to serve as a baseline for measuring emissions reductions.

STEP 4

Completed a memo with recommended approaches for conducting future Greenhouse Gas Inventories based on lessons learned from the 2019 effort and performance indicators in the Green Marine certification, of which the Port is a participant.

2022

STEP 5

Completed a Port-wide Vulnerability Assessment to determine the Port's specific vulnerabilities to sea level rise and storm surges.

STEP 6

Revised the Vulnerability Assessment to expand the Exposure, Sensitivity and Adaptive Capacity (ESA) Analysis, developing a detailed methodology and conducting a pilot implementation of the ESA to analyze the vulnerability of specific Port infrastructure.

STEP 7

Identified targets, goals, strategies and 2023 priority actions to reduce greenhouse gas emissions.

STEP 8

Identified targets, goals, strategies and 2023 priority actions to build the Port's resiliency to climate change effects.

2023

STEP 9

Compiled key information into the Climate Action Strategy report.

Relationship with Other Relevant Plans and Strategies

The Climate Action Strategy is designed to align and integrate with other Port of Bellingham strategic goals and plans, as well as with several that are external to the Port but is relevant to the Port's operations.

Table 1 includes the major plans and processes – both internal and external to the Port - that have the most direct relationship to the Climate Action Strategy. Where appropriate, recommendations for how the Strategy should be integrated with existing plans (and vice versa) are included. This is intended to help align Port planning processes and efforts. The selected actions should support (and not conflict with) the Port's strategic objectives.

Table 1: Internal and External Plans and Processes Relevant to Climate Action Strategy

Internal Plans and Processes	Relationship to Climate Action Strategy
Asset Management program	The ESA Analysis should be incorporated into the Port's Asset Management program (in progress).
Annual Strategic Budget	Upon completion of the annual prioritization of CAS actions process, the Port will develop a climate budgeting process for mapping cost and pulling this information into the Annual Strategic Budget.
Annual work plans	Prioritized CAS actions identified on an annual basis should be pulled into Port Divisional work plans.
Comprehensive Scheme of Harbor Improvement Plan (CSHIP)	Priority capital project actions from the CAS will need to be incorporated in the CSHIP, which is updated annually. The Climate Action Strategy will be updated at the same frequency.
External Plans and Processes	**Relationship to Climate Action Strategy**
City of Bellingham - Waterfront District Subarea Plan (2019)	Actions to advance the Climate Action Strategy will be prioritized annually; these selected actions should support (and not conflict with) the stated objectives of the Subarea Plan to balance environmental, economic and community objectives developed to restore the health of the land and water, improve waterfront access, promote a healthy and dynamic waterfront economy, and reinforce the inherent qualities of the waterfront[2].

2 The Waterfront District Subarea Plan, 2019, p. 1.

Puget Sound Maritime Air Forum	This cross-border initiative measures maritime related air pollutant and GHG emissions. Participation in the Puget Sound Maritime Air Emissions Inventory is voluntary. The Port may consider more active participation in the Puget Sound Maritime inventory now that it is conducting greenhouse gas emission inventories (historically, the Port's emissions have been estimated).

Key Partner and Community Engagement

Input from the Port's partners and stakeholders has been an important aspect of the development of the Strategy and will continue to be so throughout its adoption and implementation. The Port sought high-level input internally (from Port Commissioners, Division Managers, and staff) and externally (from the public, Port tenants and customers, and local and regional partners such as the City of Bellingham, Whatcom County, and local tribes). Input was incorporated into the final targets, goals, strategies, and actions for both emissions reduction and climate change resilience-building efforts.

The feedback collected through the engagement process confirmed that there is strong support for the Port's decision to develop a Climate Action Strategy and take measures to reduce emissions and build climate change resilience into the Port's operations.

The following tools and activities were used to solicit input from partners and stakeholders during the development of the Climate Action Strategy:

- 2019 Planning Survey for internal Port staff to solicit their input on priorities for climate planning. This information helped inform the Climate Roadmap.
- Interactive internal meetings to build on input from the 2019 Planning Survey.
- Dedicated Climate Action Strategy Webpage.
- 2020 Visioning Workshop with Port staff to identify vision and goals for climate work.
- Internal meetings with Port Divisions to get input on greenhouse gas emissions reduction and climate change resilience-building targets, goals, strategies, and actions.

- Presentations and feedback from Port Commissioners.
- External meetings with:
    - Working Waterfront Coalition
    - Marine Advisory Council
    - RE Sources
    - Joint Climate Action Team (JCAT)
- Public review period for Draft Climate Action Strategy – Spring 2023.

Many of these partners and stakeholders, including Port tenants, have expressed strong interest in this process, voicing concerns about climate impacts ranging from reduced fish stocks and market value of real estate to damage to infrastructure from flooding. The feedback collected through the input process so far has confirmed that there is strong support for the Port's decision to develop a Climate Action Strategy and take measures to reduce emissions and build climate change resilience into the Port's operations.

Section 2. Addressing Greenhouse Gas Emissions

Port of Bellingham Summary of GHG Emissions Reduction Targets, Goals, and Strategies

Target: The Port of Bellingham aims to achieve a reduction of Port-controlled GHG emissions of at least 90% from 2019 levels by 2030 and 100% from 2019 levels by 2050.

Goal 1: Significantly reduce GHG emissions from Port-controlled energy supply and buildings.	Strategy 1.1: Enhance the energy efficiency of Port buildings and operations.
	Strategy 1.2: Maximize renewable energy production and use.
	Strategy 1.3: Transition from natural gas-powered equipment to efficient, electric equipment in Port buildings.
	Strategy 1.4: Increase energy conservation communication and education for Port employees.
Goal 2: Reduce GHG emissions from Port-controlled fleet vehicles, vessels, and equipment.	Strategy 2.1: Expand electric vehicle (EV) charging opportunities across Port workstations.
	Strategy 2.2: Transition from fossil fuel powered vehicles to cleaner modes of travel for on-road vehicles, as technology permits.
	Strategy 2.3: Transition from fossil fuels to cleaner heavy and cargo-handling equipment (CHE), as technology permits.
	Strategy 2.4: Optimize the Port's fleet size and equipment pool.
	Strategy 2.5: Provide EV- and efficient-driving education and training opportunities for Port employees.
Goal 3: Reduce emissions associated with Port employee commutes.	Strategy 3.1: Promote telework and other flexible work arrangements.
	Strategy 3.2: Promote sustainable transportation opportunities for employee commutes.
	Strategy 3.3: Advocate for safer and more accessible multimodal transportation options for Port worksites.
	Strategy 3.4: Support employee transition to EVs.

Goal 4: Monitor the Port's progress towards meeting GHG reduction targets.	Strategy 4.1: Track GHG emissions annually over time.
	Strategy 4.2: Where emission reductions are infeasible or cost-prohibitive, pursue carbon offsetting to stay aligned with the Port's 2030 and 2050 GHG emission reduction targets.
Goal 5: Reduce GHG emissions from all Port tenant-controlled buildings and energy supply.	Strategy 5.1: Support increased energy efficiency of tenant-controlled buildings and operations.
	Strategy 5.2: Promote tenant renewable energy production and purchase.
	Strategy 5.3: Promote the transition from natural gas-powered heating and cooling equipment to efficient, electric equipment in tenant-controlled buildings.
	Strategy 5.4: Provide energy conservation communication and education for Port tenants.
Goal 6: Encourage reduction of emissions associated with tenant vehicles, vessels, and equipment.	Strategy 6.1: Encourage tenant transition to EVs.
	Strategy 6.2: Promote trip reduction opportunities associated with tenant commutes.
	Strategy 6.3: Reduce emissions associated with ocean-going and harbor vessels, as technology permits.
	Strategy 6.4: Support adoption of tenant-owned zero-emission equipment, as technology permits.

Overview

Keeping the amount of Earth's warming from crossing a crucial tipping point is a key component of global efforts to address climate change. The Intergovernmental Panel on Climate Change (IPCC) indicates that, by 2040, there is a probability of over 50% that global temperatures will rise to or surpass 1.5 degrees Celsius compared to pre-industrial temperatures--the amount of warming the Earth can withstand before natural systems begin to collapse. Even global warming of 1.5°C will result in an increase in heat waves, longer warm seasons, and shorter cold seasons. In a high-emissions trajectory, this threshold could be reached even earlier. However, substantial, swift, and sustained reductions in GHG emissions can decelerate global warming (IPCC, 2023). In response to this, governments and organizations around the world have called for a significant and rapid reduction in GHG emissions to avoid the worst impacts of climate change.

A common first step in reducing emissions is understanding the primary sources of those emissions. Within Whatcom County, industry, waste, and agriculture are the greatest sources of emissions, responsible for 57.8% of all communitywide emissions, as shown in Figure 1 (Whatcom County, 2021a). Electricity is the next greatest source of emissions (18.2%), followed by transportation (13.7%) and building heating (10.3%). To address its impacts, the County has set a target of reducing communitywide emissions by 45% below 1990 levels by 2030 and 95% below 1990 levels and net zero emissions by 2050.

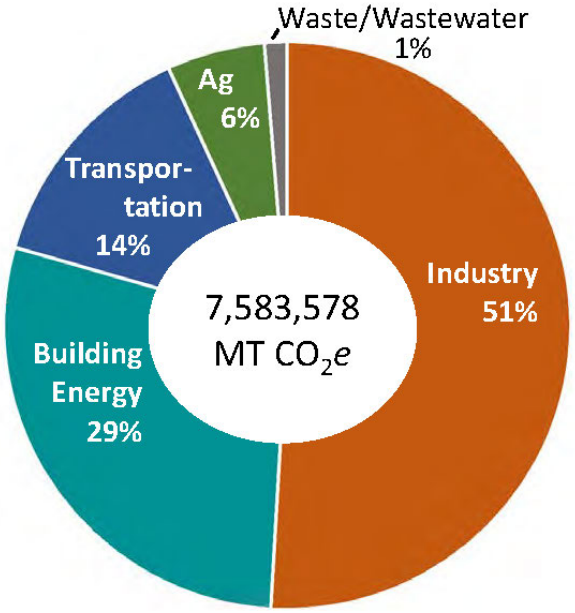


Figure 1: A breakdown of 2017 Whatcom County Communitywide Greenhouse Gas Emissions by sector. Building heating includes all residential, commercial, and industrial buildings use of fossil fuels for heating buildings and water (does not include heating by electricity). The County includes fugitive emissions from refrigerants with Buildings (Whatcom County, 2021a).

Recognizing the pressing need to support local efforts to reduce GHG emissions and help avoid the worst impacts of climate change, the Port of Bellingham is taking proactive steps to assess and reduce its own emissions.

The following section summarizes the primary sources of Port-controlled GHG emissions and identifies the Port's goals and strategies to reach its emissions reduction targets.

2019 Greenhouse Gas Emissions Inventory

The Port's 2019 Greenhouse Gas Inventory (the 2019 Inventory) quantified GHG emissions from Port operations for the 2019 calendar year. It was conducted using the widely accepted Climate Registry General Reporting Protocol and emission source data provided by the Port and its vendors.

The 2019 GHG Inventory focuses on emission sources from the Port's core administrative functions (Scopes 1 and 2) as well as employee commuting (Scope 3).

The 2019 Inventory focused on two broad categories of emissions – "direct emissions" (from sources under the Port's direct control) and "indirect emissions" (from sources not under the Port's direct control, but that occur because of the Port's activities) (Cogent Environmental Consulting, 2020). These two categories are further defined as Scope 1, Scope 2 and Scope 3 emissions, referring to the level of control that an organization has over the various emission sources. Definitions of Scopes 1, 2 and 3 emissions are included in Table 2.

The 2019 Inventory quantifies Scope 1 and Scope 2 emissions from the Port's core administrative functions, such as facilities, equipment, and employee activities. Additionally, it includes emissions from Port employee commutes, which fall within the Scope 3 emissions category. It excludes Scope 3 emissions such as tenant-controlled energy use and activities, waste generated from Port operations, and emissions related to airplanes flying into and out of the Port.[3] See

3 The 2019 Inventory focused on direct emissions from Port operations and does not include most Scope 3 emissions. These indirect emissions were deemed a lower priority for inclusion in the Inventory because the Port has relatively less control or influence over them.

Relevant Scope 3 emissions could be quantified in the future for a more comprehensive look at the emissions associated with the Port. Examples of Scope 3 emissions that may be quantified in the future include tenant-controlled use of energy in Port buildings (e.g., when a tenant is metered directly or rebilled for its energy use), the Port's purchased goods and services, waste generated from Port operations, and "supply chain" emissions related to the Port's line of business. Supply chain sources include airplanes flying in/out of the airport; cargo vessels, ferries, harbor craft, and recreational vessels calling at Port terminals/marinas; and port-related loading equipment, rail, and drayage trucks.

Table 3 for additional details about the GHG emission sources included in the 2019 Inventory.

Table 2: Scopes 1, 2, and 3 Descriptions

Scope	Definition	Emissions Sources Included in the Port's GHG Inventory
1	Direct GHG emissions from sources under the direct control and operation of the Port.	Natural gas burned in Port-controlled buildings; fuel burned in the Port-owned fleet; fugitive emissions from refrigerants used in Port-controlled buildings and vehicles.
2	Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling.	Purchased electricity used in Port-controlled buildings and operations.
3	GHG emissions from assets not owned or controlled by the Port, but that the Port indirectly affects in its value chain.	Port employee commutes.

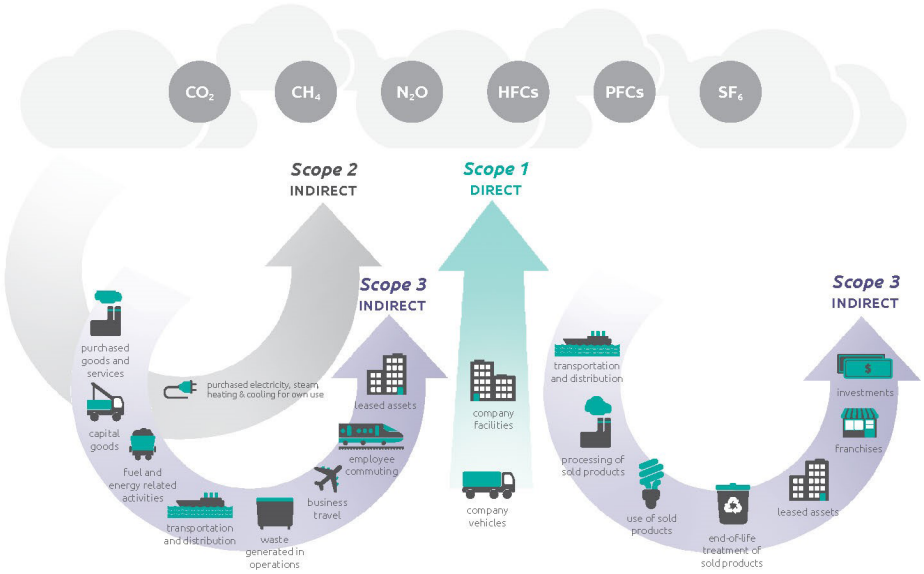


Figure 2: Scope 1, 2, and 3 GHG Emissions Sources. Source: WRI/WBCSD Corporate Value Chain (Scope 3) Accounting and Reporting Standard (PDF), page 5.

Table 3: GHG Emission Sources Included in Port of Bellingham 2019 GHG Emissions Inventory

Source	Description	Scope #
Port-controlled fleet	Gasoline and diesel fuel burned in vehicles, vessels, and other mobile equipment owned by the Port and operated by Port staff.	1
	Fugitive emissions from fluorinated refrigerants used in Port-operated fleet vehicle air-conditioning systems.	1
Port-controlled buildings and facilities	Natural gas burned in Port-controlled buildings, including portions of the airport, shipping terminal, cruise terminal, marinas, administrative buildings, and some leased properties where the Port controls energy use.	1
	Electricity used in Port-controlled buildings, including portions of the airport, shipping terminal, cruise terminal, marinas, parks and public access areas, administrative buildings, and some leased properties where the Port controls energy use.	2
	Fugitive emissions from fluorinated refrigerants used in Port-operated building air conditioning and refrigeration systems.	1
Port employee commutes	Fuel emissions by Port staff vehicles commuting to and from work.	3

Results of 2019 GHG Inventory

In 2019, Port-controlled emissions totaled almost 5,700 metric tons of carbon dioxide equivalent (MT CO_2e) (Cogent Environmental Consulting, 2020). This is comparable to the GHG emissions from the electricity used to power 1,109 homes for one year, according to the EPA.

In 2019, Port-controlled emissions totaled almost 5,700 metric tons of carbon dioxide equivalent (MT CO_2e).

As shown in Figure 3, electricity used in Port-controlled buildings was the dominant source of the Port's GHG emissions in 2019, accounting for 86% of total emissions (4,912 MT CO_2e) (Cogent Environmental Consulting, 2020). The next largest source was natural gas used in Port-controlled buildings, representing 7% of total emissions (395 MT CO_2e). Employee commutes accounted for 3% (177 MT CO_2e), fleet fuels accounted for 3% (158 MT CO_2e), and fugitive emissions from refrigerants accounted for 1% (45MT CO_2e) of total emissions. See Appendix C for a more detailed summary of the 2019 Inventory results.

The 2019 GHG Inventory represents an important starting point for the Port of Bellingham to gauge its progress in reducing emissions over time. As a "baseline" inventory, it provides a picture of the Port's emissions footprint and serves as a benchmark against which to measure future reductions. This approach will enable the Port to track its progress over time, identify areas for improvement, and implement targeted strategies for reducing its emissions into the future.

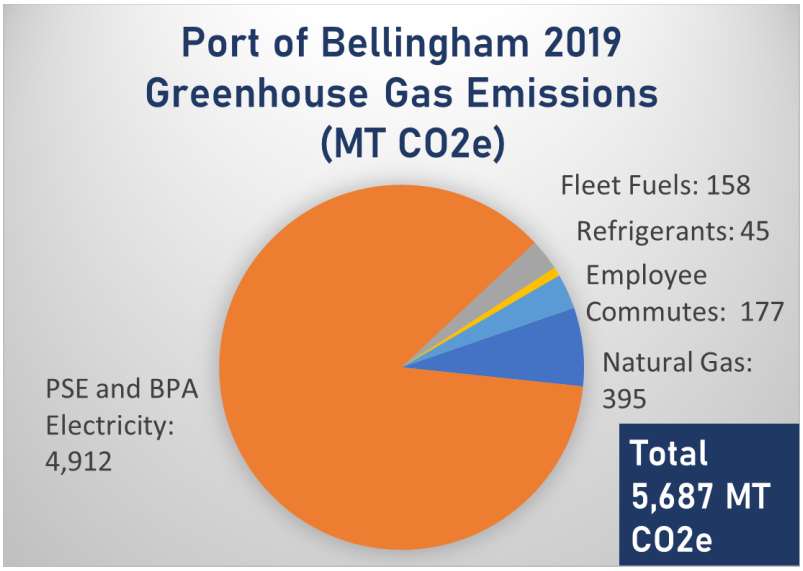


Figure 3: Port of Bellingham 2019 Greenhouse Gas Emissions in MT CO2e. Of all electricity use (4912 MT CO2e), BPA: 0.5% and PSE: 99.5%. Of total emissions (5700 MT CO2E), PSE accounted for 85.8% (4888 MT CO2e) and BPA accounted for 0.4% (24 MT CO2e).

GHG Emission Reduction Goals and Strategies

In 2022, the Port of Bellingham set an ambitious target to achieve a reduction of Port-controlled GHG emissions of at least 90% from 2019 levels by 2030 and by 100% from 2019 levels by 2050.

The following section of this Strategy outlines the Port's goals and strategies to achieve its emissions reduction target. While the Strategy focuses on reducing emissions associated with Port-controlled buildings and energy supply, fleet vehicles, vessels, and equipment, and employee commutes, it also includes a small number of efforts to

Port-Controlled Emissions Reduction Target:

Reduce Port-controlled emissions from 2019 levels by:

- 90% by 2030
- 100% by 2050.

encourage emissions reductions associated with tenant-controlled buildings and energy as well as tenant-controlled vehicles, vessels, and equipment.

The goals and strategies included in this section were informed by the 2019 Inventory and other local climate planning documents such as the Whatcom County 2021 Climate Action Plan and the City of Bellingham 2018 Climate Protection Action Plan. They are aligned with other key Port planning documents and informed by input from Port staff and commissioners.

Solar panels installed on Bellingham Cruise Terminal. Source: Port of Bellingham

Reducing Port-Controlled Emissions

By taking steps to reduce its GHG emissions, the Port can help to mitigate climate change, contribute to a healthier environment and community, support local economic development, and serve as a model for other organizations looking to adopt more sustainable practices. The following goals and strategies address emissions that are under direct control of the Port or that the Port can strongly influence.

BUILDINGS & ENERGY SUPPLY

Goal 1: Significantly reduce GHG emissions from Port-controlled energy supply and buildings.

The Port's energy supply and buildings were the dominant source of GHG emissions (93% of total emissions) in 2019. Electricity accounted for 86% of the Port's total emissions and natural gas used in Port-controlled buildings represented 7% of total emissions. The Port has an opportunity to significantly reduce its emissions by focusing on energy efficiency and conservation and renewable energy procurement and usage.

Strategy 1.1: Enhance the energy efficiency of port buildings and operations.

By enhancing the energy efficiency of its buildings and practices through energy saving upgrades like weatherization and smart technology, the Port can continue its normal operations while significantly reducing its overall energy consumption and greenhouse gas emissions. Moreover, efficiency upgrades and efforts can generate substantial cost savings over time while contributing to the Port's long-term sustainability and climate change resilience goals.

In 2021, the Port took an important step toward its building and energy emission reduction goal by joining Puget Sound Energy's Green Direct Program, which enables the Port to purchase its electricity from a local, renewable energy resource. Also in 2021, the Port installed 336 solar panels on the Bellingham Cruise Terminal, generating 100 kW of clean power.

Strategy 1.2: Maximize renewable energy production and use.

Renewable energy sources, such as solar and wind power, provide a sustainable and continuously replenished source of energy without the greenhouse gas emissions associated with fossil fuel-based energy and electricity generation. Additional opportunities to maximize renewable energy production and use includes measures such as District Energy, expanding the Port's renewable energy production and usage, partnering with tenants and other organizations to support additional renewable energy efforts, and supporting policies that promote renewable energy.

Strategy 1.3: Transition from natural gas-powered equipment to efficient, electric equipment in port buildings.

Transitioning from natural gas-powered equipment to more efficient, electric equipment is a crucial step for the Port to reduce its emissions. Not only does natural gas-powered equipment emit methane and other greenhouse gases into the atmosphere, but it also contributes to air pollution, posing a serious threat to public health. By transitioning to efficient, electric equipment, the Port can reduce its carbon emissions, save on energy costs, and improve air quality for employees and the surrounding community. Moreover, by taking proactive steps toward transitioning to renewable energy sources for its electricity use, the Port will be more likely to remain competitive and demonstrate their leadership and commitment to sustainability and social responsibility.

Strategy 1.4: Increase energy conservation communication and education for port employees.

An additional avenue for reducing emissions associated with the Port's buildings and energy supply lies in encouraging behavioral changes among employees. By effectively communicating best practices and promoting energy-efficient behavior, the Port can increase employee participation in those practices and behaviors and achieve greater energy savings. Not only does this approach represent a cost-effective and accessible means of reducing energy consumption, but it can also help to foster a culture of sustainability and responsibility among employees.

FLEET VEHICLES, VESSELS & EQUIPMENT

Goal 2: Reduce greenhouse gas emissions from Port-controlled fleet vehicles, vessels, and equipment.

Although the Port's fleet vehicles, vessels, and equipment account for only 2.8% of total emissions, the Port has already taken steps to address this source of emissions. For example, it has installed several electric vehicle chargers and has plans to install more. Further reducing emissions from Port-controlled fleet vehicles, vessels, and equipment is key for the Port to reach its emissions reduction target while realizing other co-benefits like improved air quality.

Strategy 2.1: Expand electric vehicle charging opportunities across Port workstations.

Installing charging stations at Port locations will enable the Port to transition its own fleet to electric vehicles (EV) over time. EVs have a significantly lower carbon footprint than traditional gasoline-power vehicles, especially when charged with electricity generated from renewable sources. Providing sufficient EV charging at Port work locations is a crucial first step for the Port to reduce emissions from fleet vehicles. Additionally, Port visitors could be provided access to charging stations to support EV adoption in the wider community. This installation would help the City of Bellingham meet its target for increasing EV charging capacity.

Strategy 2.2: Transition from fossil fuel powered vehicles to cleaner modes of travel for on-road vehicles, as technology permits.

Transitioning the Port's fleet to EVs or other zero- or low-emission vehicles is a critical step to-

ward reducing the Port's overall emissions. EVs are not only cleaner than their gasoline-powered alternatives, emitting no tailpipe pollutants and fewer GHG emissions, but can also be more cost-effective to operate and maintain. After assessing options, costs, and targets for EV fleet deployment, the Port should begin by deploying market-ready, light-duty EVs and piloting emerging EV technology in medium- and heavy-duty vehicles.

Strategy 2.3: Transition from fossil fuels to cleaner heavy and cargo-handling equipment (CHE), as technology permits.

The Port has an opportunity to reduce emissions associated with its equipment by transitioning from fossil fuel-powered equipment like forklifts and other cargo-handling equipment to electric or alternatively fueled equivalents. Deploying market-ready electric equivalents for fossil fuel-powered equipment at the point of replacement will further the reductions in GHG emissions from this type of equipment. Additionally, by piloting emerging electric technology in additional equipment, the Port can provide an example for other organizations pursuing sustainable operations.

Strategy 2.4: Optimize the Port's fleet size and equipment pool.

Optimizing or right sizing the Port's fleet and equipment pool (e.g. matching fleet composition to user needs and using the smallest, most energy efficient vehicle for the job) serves two important purposes for emissions reduction. Firstly, it can reduce the financial cost of transitioning to an electric and low-carbon fleet and equipment pool by minimizing the number of vehicles that need to be replaced. Secondly, it can minimize the negative environmental and social impacts associated with sourcing materials (e.g., lithium) for electric vehicles and equipment. By assessing its current fleet and equipment needs, the Port can identify opportunities to reduce redundancies, streamline operations, and eliminate unnecessary costs.

Strategy 2.5: Provide electric vehicle and efficient-driving education and training opportunities for Port employees.

By offering adequate education and training, the Port can provide employees with the knowledge and skills needed to operate and maintain electric and low-carbon vehicles efficiently. This approach can not only help the Port achieve its emission reduction target but also contribute to a culture of sustainability among employees.

EMPLOYEE COMMUTES

Goal 3: Reduce emissions associated with Port employee commutes.

Employee commutes accounted for 3.1% of the Port's total emissions in 2019. While the Port does not have direct control over employees' vehicles and commute patterns, it can take steps to encourage employees to pursue alternative transportation methods.

Strategy 3.1: Promote telework and other flexible work arrangements.

Teleworking allows employees to work from home rather than commuting daily to a work site. By encouraging telework, the Port can reduce commute-associated emissions by cutting down on employees' vehicle miles traveled (VMT) and minimizing the office space needed for daily operations. In 2021, the Port revised its existing telework policy to allow for increased teleworking opportunities for eligible employees.

Strategy 3.2: Promote sustainable transportation opportunities for employee commutes.

By encouraging and incentivizing the use of public transportation, ridesharing, and non-motorized transportation to get to work, the Port can help to reduce employee reliance on single-occupancy vehicles. This will, in turn, decrease the total VMT and GHG emissions associated with employee commuting. Providing end-of-trip facilities such as secure bicycle parking and lockers rooms or showers can further encourage sustainable choices by employees.

Strategy 3.3: Advocate for safer and more accessible multimodal transportation options for Port worksites.

By coordinating with local agencies and jurisdictions, such as Whatcom Transportation Authority, Whatcom County, the City of Bellingham, the Whatcom Council of Governments "Washington Smart Trips" program, and the City of Blaine, the Port can advance enhanced multimodal transportation options such as additional bike lanes and bus service to Port properties. By doing so, the Port can increase equitable access to Port properties and promote the health and well-being of the community, all while addressing climate change.

Strategy 3.4: Support employee transition to electric vehicles.

The Port can reduce its emissions associated with employee commutes by supporting the transition of its employees from gasoline-powered vehicles to EVs. To support this transition, the Port can make it as easy to charge at work as it is to park at work and increase the visibility of and knowledge about different EV models. By incentivizing the shift to EVs, the Port can lead by example, reduce its emissions, and contribute to a culture of sustainability among employees.

Goal 4: Monitor the port's progress toward meeting GHG reduction targets.

GENERAL STRATEGIES

Beyond reducing emissions directly, the Port can take several steps to ensure that it is on track to reach its targets of at least 90% reduction in emissions from 2019 levels by 2030 and 100% by 2050, including monitoring emissions and offsetting those that cannot be eliminated at this time.

Strategy 4.1: Track GHG emissions over time.

By consistently and accurately tracking its GHG emissions annually over time, the Port can monitor primary sources of emissions and prioritize effective reduction actions into the future. This will enable the Port to take targeted and impactful action toward achieving its GHG emission reduction target.

Strategy 4.2: Where emission reductions are infeasible or cost-prohibitive, utilize carbon offsetting to stay aligned with the 2030 and 2050 GHG emission reduction targets.

Directly reducing emissions is critical for the Port to make meaningful progress toward its emission reduction goals and long-term sustainability. However, certain sources of emissions cannot be directly eliminated in the near-term due to factors such as lack of complete control over the sources or cost-prohibitive technology. Coupled with direct reduction strategies, carbon offsetting provides a useful tool for the Port to balance emissions that are difficult to eliminate while continuing to make strides toward achieving its GHG emission reduction targets. The Port remains committed to reducing or eliminating its direct emissions in the future as more cost-effective and sustainable solutions become available.

Reducing Tenant-Controlled Emissions

The Port's emission reduction target focuses on Port-controlled emissions. However, the Port acknowledges that this represents only a portion of its total emissions and that additional work is needed to support tenants in reducing their emissions.

TENANT BUILDINGS & ENERGY SUPPLY

Goal 5: Reduce GHG emissions from all Port tenant-controlled buildings and energy supply.

While the Port does not have direct control over tenants' buildings and energy supply, it can take steps to encourage tenants to reduce emissions by focusing on energy efficiency and renewable energy procurement and usage.

Strategy 5.1: Support increased energy efficiency of tenant-controlled buildings and operations.

By increasing the energy efficiency of tenant-controlled buildings and practices, Port tenants can continue their operations while consuming less overall energy. In the long run, increasing energy efficiency can lead to cost savings for Port tenants. While the Port does not have direct control over the equipment and operations of many of its tenants, it can promote energy efficiency through providing tenants with resources and information relating to efficiency upgrades, promoting incentives for energy audits and efficient equipment, and piloting smart performance leases to incorporate energy efficiency and conservation into terms of standard leases.

Strategy 5.2: Promote tenant renewable energy production and purchase.

Compared to fossil fuels, renewable energy usage significantly reduces the GHG emissions associated with energy production, transportation, and consumption. The Port can encourage tenant adoption of renewable energy in two primary ways. First, the Port can expand its participation in PSE's Green Direct program to include tenant meters. Second, the Port can support and incentivize renewable energy production on tenant-occupied and/or owned buildings or through community solar opportunities, as available.

Strategy 5.3: Promote the transition from natural gas-powered heating and cooling equipment to efficient, electric equipment in tenant-controlled buildings.

Transitioning from natural gas-powered equipment to highly efficient, electric equipment will enable Port tenants to reduce their GHG emissions, save on energy costs, and improve local air quality. The Port can encourage this transition by providing information and resources about efficient, electric equipment and rebates as well as technical support.

Strategy 5.4: Provide energy conservation communication and education for Port tenants.

The Port can encourage behavioral changes by providing tenants with regular communication and education about energy conservation and other sustainable practices. This approach represents a cost-effective and accessible means of reducing energy consumption while also fostering a culture of sustainability and responsibility among tenants.

TENANT VEHICLES, VESSELS & EQUIPMENT

Goal 6: Encourage reduction of emissions associated with tenant vehicles, vessels, and equipment.

While the Port does not have direct control over tenants' vehicles and commute patterns, it can take steps to encourage tenants to pursue zero- or low-emission transportation methods.

Strategy 6.1: Encourage tenant transition to electric vehicles.

The Port can encourage tenants to transition from gasoline-powered vehicles to EVs by making it as easy to charge at work as it is to park at work (e.g., providing adequate charging and competitive prices for charging) and increasing the visibility of and knowledge about different EV models. By encouraging the shift to EVs, the Port can lead by example, reduce its emissions, and contribute to a culture of sustainability among tenants.

Strategy 6.2: Promote sustainable transportation opportunities associated with tenant commutes.

By encouraging and incentivizing the use of public transportation, ridesharing, and non-motorized transportation to get to work, the Port can help to reduce tenant VMT and associated emissions.

Strategy 6.3: Reduce emissions associated with ocean-going and harbor vessels, as technology permits.

The Port can encourage emissions reductions of tenant's ocean-going and harbor vessels through measures such as analyzing and facilitating shore power at its commercial marinas (e.g., the Marine Terminal, Cruise Terminal, and marinas, as needed) and promoting the adoption of low- or zero-emission ocean-going and harbor vessels, as technology permits.

Strategy 6.4: Support adoption of tenant-owned zero-emission equipment, as technology permits.

The Port can encourage emissions reductions from tenant-owned equipment by promoting the use of zero-emissions equipment, as technology permits. Opportunities to do this include holding demonstrations of electric forklifts and other cargo handling equipment and encouraging the use of fossil fuel-free fuels, among other measures.

Section 3. Building Resilience To Climate Change Impacts

Port of Bellingham Summary of Climate Change Resilience-Building Goals and Strategies	
Resilience Target: The Port of Bellingham anticipates, prepares for, and effectively responds to the impacts of climate change and collaborates with regional partners to protect and enhance the economy, community, and environment through Port-wide resilience programming efforts.	
Goal 7: Institutionalize and prioritize climate change resilience across all Port divisions, processes, investments, and operations.	Strategy 7.1: Understand and prepare for hazardous events, trends, or disturbances related to climate change.
	Strategy 7.2: Model and monitor existing and future climatic conditions.
	Strategy 7.3: Address climate impacts in Port policies, plans, and guidelines.
	Strategy 7.4: Establish mechanisms to ensure accountability of Port divisions in implementing the Climate Action Strategy.
	Strategy 7.5: Coordinate with local and regional jurisdictions, agencies, and institutions to collaborate on resiliency actions.
Goal 8: Increase the resilience of Port infrastructure to changing climatic conditions.	Strategy 8.1: Prevent future development in areas vulnerable to climate change hazards.
	Strategy 8.2: Protect existing shoreline and infrastructure at lower elevations from RSLR, coastal erosion and sedimentation, and riverine flooding.
	Strategy 8.3: Adapt existing and new infrastructure and operations to better withstand RSLR, storm surge, and flooding.
	Strategy 8.4: Relocate vulnerable facilities and operations to protected areas.
	Strategy 8.5: Prepare Port infrastructure for anticipated changes in weather patterns (e.g., more severe storms).
	Strategy 8.6: Prepare Port infrastructure for coastal erosion and sedimentation hazards.
	Strategy 8.7: Evaluate and mitigate wildfire and poor air quality risk for Port assets.

Goal 9: Support a local economy that is built upon sustainable practices and is resilient to climate change impacts.	Strategy 9.1: Build climate change resilience across the Port's existing economic network.
	Strategy 9.2: Support and expand climate change resilient businesses and economic opportunities around and within the Port.
Goal 10: Protect and enhance the health of Port employees, tenants, and other facility users in the face of changing climatic conditions.	Strategy 10.1: Support human health and safety during periods of extreme weather.
	Strategy 10.2: Prepare people and spaces for smoke.
	Strategy 10.3: Enhance emergency preparedness and response systems.

Overview

Human-driven climate change has and will continue to impact Whatcom County's communities, environment, and economy, even with ambitious reductions in GHG emissions. Without proper planning and implementation of mitigation and adaptation efforts, the Port could see more severe direct impacts to the marine economy (resulting in loss of jobs), its built and natural infrastructure, and various other assets.

Climate change resilience refers to the capacity of a system to **prevent, withstand, respond to, and recover from** a disturbance caused or exacerbated by climate change.

In its climate change planning efforts and daily operations, **the Port of Bellingham has set a climate change resilience target to anticipate, prepare for, and effectively respond to and recover from the impacts of climate change while collaborating with regional partners to protect and enhance the economy, community, and environment.** Climate change resilience refers to the capacity of a system to prevent, withstand, respond to, and/or recover from a disturbance caused or exacerbated by climate change. By building its climate change resilience, the Port will be able to continue operations and maintain its role as an economic engine for Whatcom County in the face of changing climatic conditions.

The following section of the Strategy describes the Port's vulnerability to RSLR and storm

surges, primarily, and additional climate change hazards, and outlines the Port's goals and strategies for building its climate change resilience. Figure 4 shows the events that can impact Port operations.

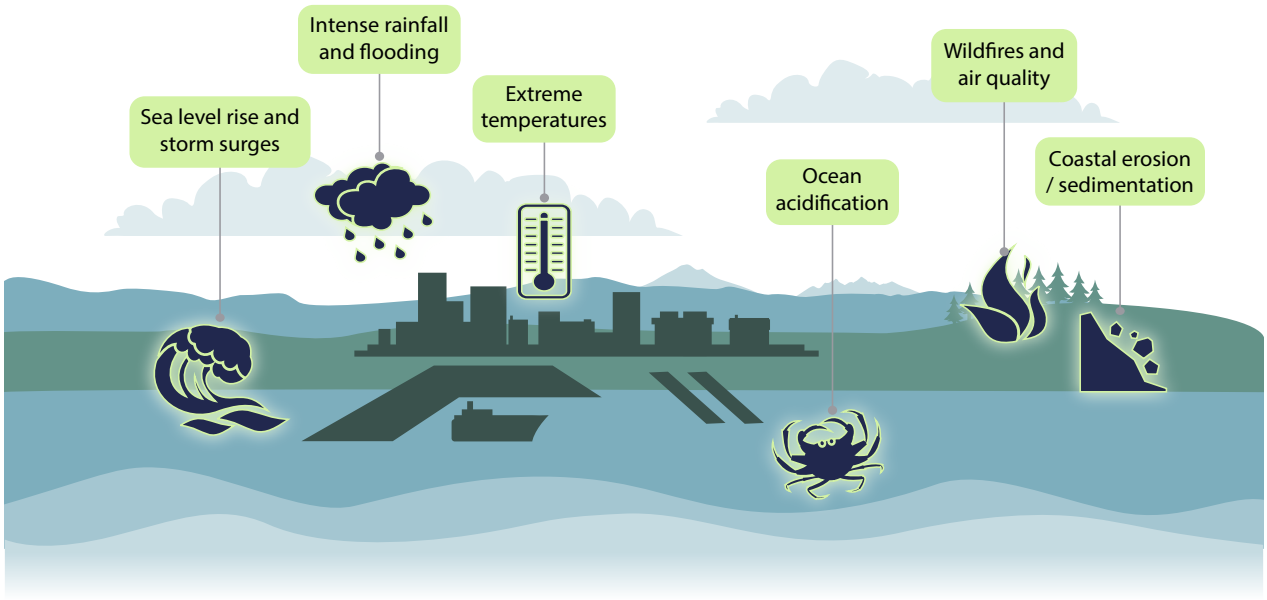


Figure 4: Climate change hazards that could impact the Port of Bellingham.

Climate Change Hazards and the Port of Bellingham

Within the past decade, Whatcom County has experienced unprecedented heat waves, sea level rise of approximately 4.68" from 1934-2021, increased frequency and intensity of heavy precipitation and more frequent flooding events, decreased snowpack, and longer wildfire seasons with more fires, more smoke, and a greater number of acres burned, among other climate change impacts (Cascadia Consulting Group, 2020). These impacts are projected to become more frequent and/or intense in the future.

Due to its proximity to the coastline, the Port is particularly vulnerable to RSLR and storm surges. RSLR puts the Port's extensive maritime operations at increased risk of an increase in the frequency of intense storms and associated storm surge resulting in flooding and impact on Port and tenant assets. In addition to impacts from flooding and coastal erosion/sedimentation, the Port also faces the climate change hazards of changing weather patterns, wildfires and air quality, extreme temperatures, and ocean acidification (EA Engineering, Science, and Technology, Inc., 2023).

The hazards are further described below and summarized in Appendix D along with assets impacted, data gaps, and a summary of recommendations to address these data gaps.

Sea Level Rise and Storm Surges

Future water level resulting from RSLR is an important factor in determining the long-term resiliency of the Port. Global sea level rise (SLR) is driven by climate change, which is causing sea levels to increase primarily due to thermal expansion as oceans warm and the melting of ice sheets/glaciers. The global mean sea level has historically increased at a rate of approximately 3 millimeters per year since the mid-1980s. This rate is expected to accelerate with the ongoing effects of climate change (NOAA et al., 2017). However, sea levels do not increase uniformly around the globe. They are spatially variable and can vary by region. This more locally focused increase is referred to as relative sea level rise (RSLR). RSLR is water level increase specific to certain locations, which can be more or less than the global average. Local variation in RSLR is a function of vertical land movement (subsidence/uplift) and changes in regional ocean currents.

Storm surges at Zuanich Park.
Source: Port of Bellingham

Coastal Vulnerability Assessment

To better understand specific Port vulnerabilities from **sea level rise** and **storm surges**, a Port-wide Coastal Vulnerability Assessment was completed (EA Engineering, Science, and Technology, Inc., 2023). The goal of the Vulnerability Assessment was to identify the Port's most vulnerable properties and to begin to develop adaptation strategies to address the impacts of future RSLR, storm events, and riverine flooding. The technical, data-driven process to assess Port vulnerabilities to RSLR and storm surges included collecting and compiling field data throughout the Port's operations; overlaying Port property maps with the U.S. Geological Survey's Coastal Storm Modeling System (CoSMoS) model to identify areas of the Port's properties that are vulnerable to flooding under various scenarios; ranking the vulnerability of Port infrastructure using the University of Washington's (UW) Climate Impacts Group RSLR projections for two scenarios (17% likelihood of occurrence and 1% likelihood of occurrence) and creating output maps. A 17% and 1% probability are commonly used to conservatively bracket the range of expected RSLR. Figure 5 depicts how the Vulnerability Assessment components come together to produce the final output maps.

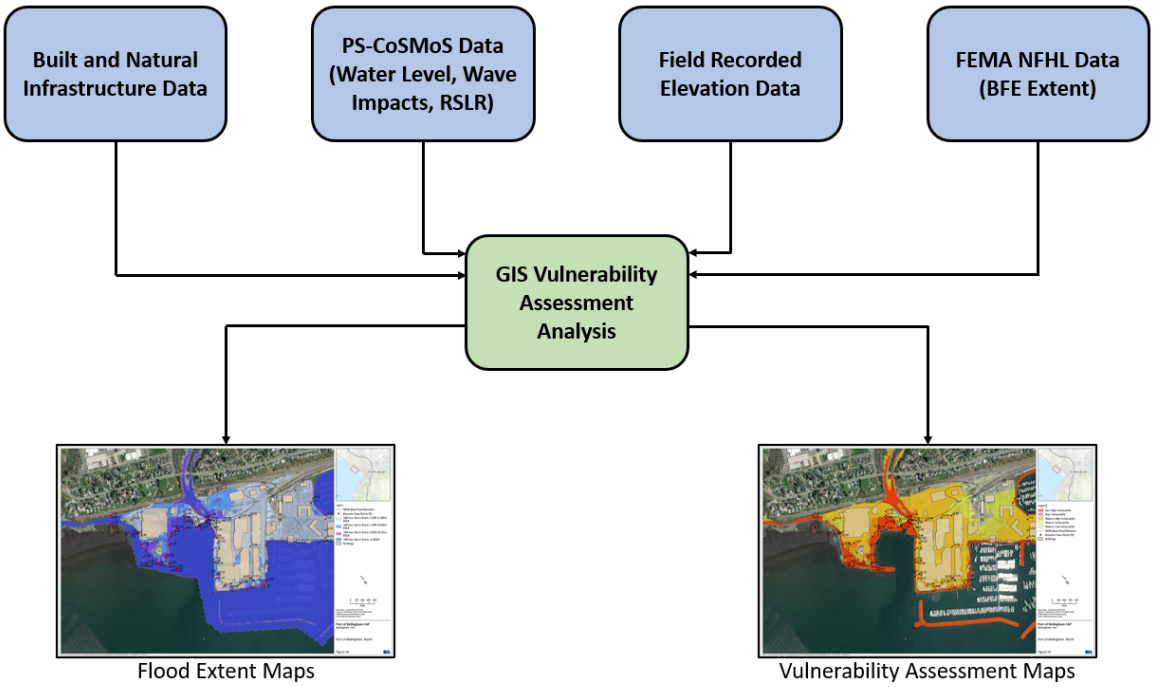


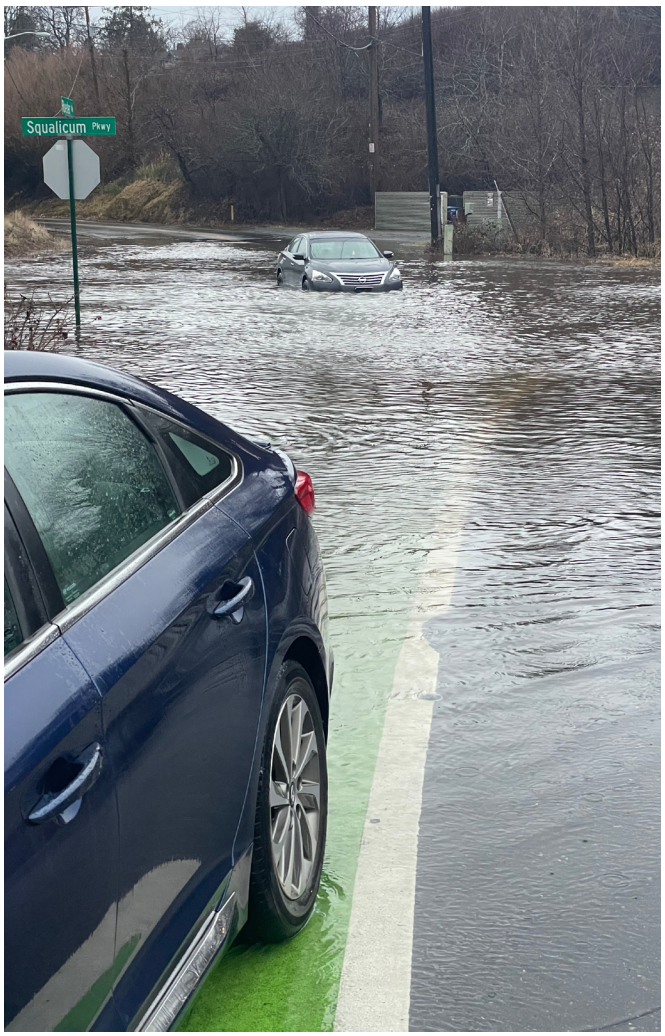
Figure 5: GIS Vulnerability Assessment Analysis Flowchart. (Light Blue Denotes Inputs and Green Denotes Analysis) (Vulnerability Assessment Figure 2-3)

Key findings from the Vulnerability Assessment include (EA Engineering, Science, and Technology, Inc., 2023):

- The Bellingham shoreline could see one meter of RSLR between 2083 and 2119. In the nearer term, by 2050, there is a 17% chance of RSLR increasing by 0.9 feet and a 1% chance of it increasing by 1.4 feet.
- The combination of RSLR and storm surge would put almost all Port facilities at risk of flooding and damage. As an example, Figure 6 shows the Squalicum Parkway Industrial Area during a projected 100-year storm and varying RSLR.
- The four areas of the Port that are currently at most at risk of flooding include:
    - Squalicum Parkway Industrial Area
    - Bellingham Shipping Terminal Area
    - Marine Trades Area by the I & J Waterway
    - The Fairhaven Marine Industrial Park

These critical infrastructure locations include parking lots, offices, local businesses, boat yards, public recreation areas, railroads, roadways and utilities.

The Bellingham shoreline could see one meter of RSLR between 2083 and 2119.



Roeder Ave at Squalicum Creek during King Tide December 2022.
Source: Port of Bellingham

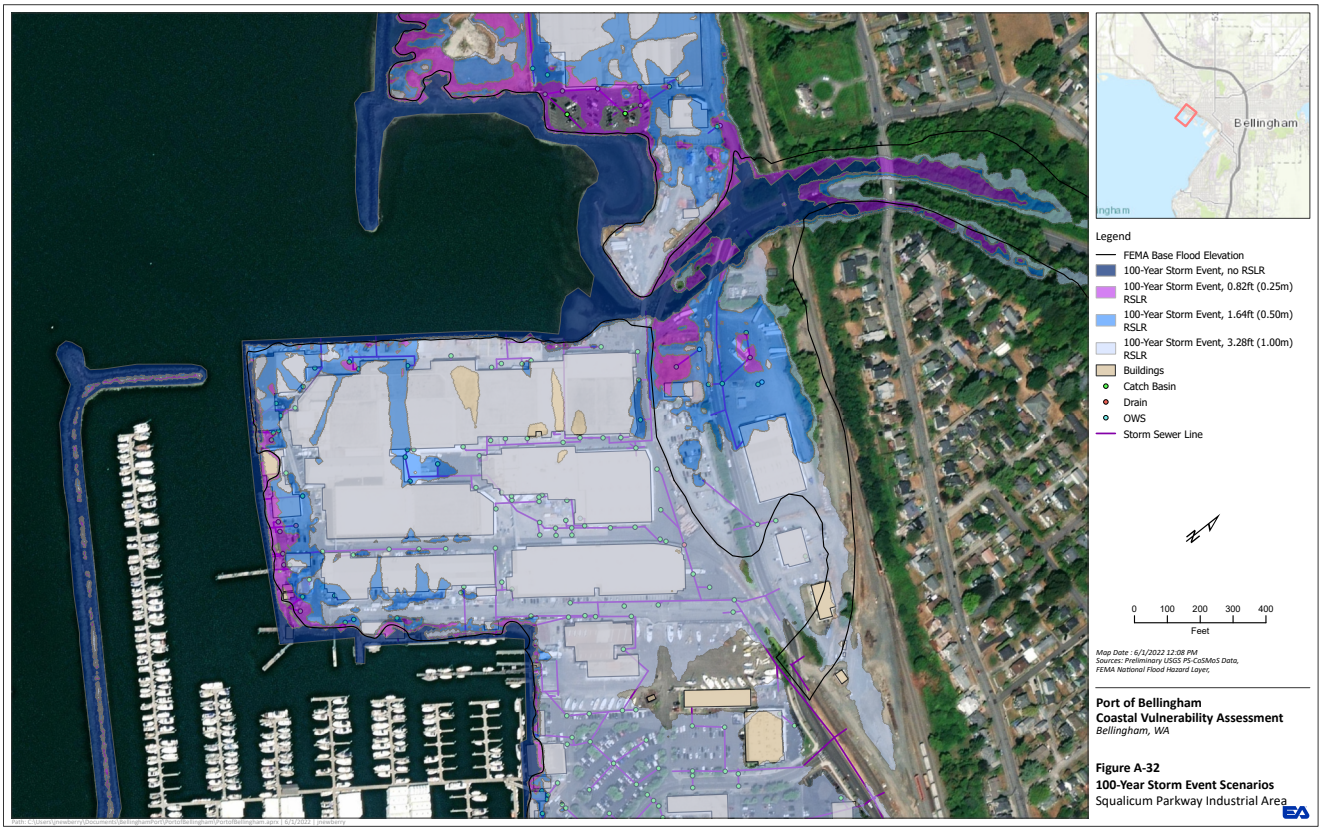


Figure 6: 100-year Storm Scenario— Squalicum Parkway Industrial Area

Central Maintenance Facility Exposure, Sensitivity, and Adaptive Capacity Analysis

The Vulnerability Assessment included a detailed methodology to conduct an Exposure, Sensitivity and Adaptive Capacity (ESA) Analysis (ESA Analysis) of Port facilities to better understand the vulnerability of specific Port assets. This methodology was piloted at the Port's **Central Maintenance Facility and surrounding storage areas.** The results of this analysis showed that 52% of analyzed assets within the Central Maintenance Facility and surrounding areas, including fuel tanks and fixed equipment, received a "High" vulnerability rating. A "High" rating refers to more immediate and frequent effects from the 10, 50 and 100-year storm events.

52% of analyzed assets within the Central Maintenance Facility and surrounding areas, including fuel tanks and fixed equipment, received a "High" vulnerability rating.

The ESA Analysis allowed the Port to fine-tune the method-

ology and approach to conducting future ESA analyses on a broader suite of vulnerable Port-wide assets.

Additional Climate Change Hazards

While the Vulnerability Assessment specifically analyzed impacts from projected RSLR and storm surge scenarios, the Port faces additional vulnerabilities from other climate change impacts, including **changes in weather patterns, flooding, coastal erosion/sedimentation, wildfires and air quality, extreme temperatures, and ocean acidification.** Since Whatcom County, one of the Port's regional partners, has already completed a climate action plan to address these specific vulnerabilities, recommendations for addressing them are informed primarily from the County's work.

Additional climate change hazards and a summary of future conditions and potential impacts is included below.

Changes In Weather Patterns

Climate change is expected to bring about significant shifts in weather patterns worldwide, and Puget Sound is no exception. According to projections, average annual precipitation in the region is set to rise by 4% to 5% by the 2050s, depending on whether low or high emissions scenarios are realized, respectively, relative to the 1970-1999 average (Cascadia Consulting Group, 2020). This will likely result in wetter conditions during the spring, fall, and winter months, while summers are projected to become drier and warmer. In fact, there could be a 50% drop in summer precipitation under a high-emissions scenario by the 2050s. Additionally, climate change will likely fuel an increase in both coastal and inland flooding.

Additionally, storms with high winds are expected to become more frequent. Transportation and shipping services may be interrupted by more intense and more frequent storms and increased wind speeds may threaten infrastructure (EA Engineering, Science, and Technology, Inc., 2023).

Climate change is projected to lead to an increase in the frequency of high intensity coastal storm events. This is because the Earth's climate is getting warmer, leading to higher sea levels and increased energy in the atmosphere, making severe storms more likely to happen. So, what used to be a rare event could become a more frequent occurrence due to the changes happening in our climate. Additionally, as these storms become more frequent

what used to be a 1% annual exceedance probability storm event (100-year storm) may shift to become more frequent.

Flooding

Climate change is projected to lead to a greater frequency of intense precipitation events, increasing the risk of flooding. Heavy precipitation events west of the Cascades are projected to intensify by 22% by the 2080s under a high-emissions scenario and occur with greater frequency, happening five more days per year, within the same time frame (Cascadia Consulting Group, 2020).

Moreover, rising sea levels are expected to impede the ability of Port facilities to drain stormwater, resulting in amplified flooding due to precipitation events (EA Engineering, Science, and Technology, Inc., 2023). This phenomenon, known as compound flooding, poses a serious threat to Port facilities, particularly those that are subject to more frequent or permanent inundation. Additionally, these facilities may become more vulnerable to corrosion as a result of elevated ocean acidification levels as well as more frequent saltwater intrusion.

BNSF spur at Squalicum Creek during 2022 King Tide.
Source: Port of Bellingham

Coastal Erosion/Sedimentation

Limited erosion hazards have thus far been identified for Port properties (at Squalicum and Blaine); however, Port Engineering and Facilities leads are aware of this hazard. The Whatcom County Natural Hazard Mitigation Plan currently deems this hazard as inapplicable to the Port, given present circumstances (Whatcom County, 2021b). However, with projected rising sea levels and shifts in weather patterns, coastal erosion and sedimentation patterns are expected to shift, possibly jeopardizing Port infrastructure and shipping channels (EA Engineering, Science, and Technology, Inc., 2023).

Erosion at Marine Park South.
Source: Port of Bellingham

Moreover, more frequent and intense precipitation events, coupled with coastal watershed development, may elevate the amount of sediment entering Bellingham Bay and other areas of Puget Sound, thereby increasing the risk of sedimentation-related harm.

Wildfires And Air Quality

In western Washington, rising temperatures, reduced summer precipitation, and earlier snowmelt are all anticipated to contribute to drier fuel conditions during summer. Consequently, the likelihood of wildland fires will intensify. Specifically for western Washington, the projected increase in the number of very high fire danger days (defined as days with 100-hour fuel moisture below the historical 10th percentile) is estimated to reach 48 days by the 2050s, a rise from the previous 36 days experienced during the period from 1971 to 2000. (Morgan et al., 2019). In the future, the Pacific Northwest is projected to experience a more than threefold increase in the average area burned annually by the 2040s, compared to the period of 1916-2006. (Morgan et al., 2019).

As wildfire activity in the Pacific Northwest intensifies, it is expected that air quality in What-

com County will decline, particularly during the summer and early fall. This may have negative consequences for Port operations. Furthermore, warmer temperatures and a rise in ozone pollution could exacerbate this trend, potentially leading to further air quality degradation in the County.

Extreme Temperatures

In Washington, summers are getting longer, hotter, and potentially more dangerous. According to climate scientists, there will be an increase in the number of very hot days and extreme heat events across the state with climate change. The extent of this increase will depend on the specific location and future greenhouse gas emissions. If current trends in greenhouse gas emissions persist, scientists project that by the middle of the century, the average year in Washington will be warmer than the hottest year of the 20th century (Snover et al., 2019).

Ocean Acidification

Ocean acidification is a consequence of the increasing carbon emissions caused by human activity. It occurs when carbon dioxide is absorbed by the ocean, resulting in a more acidic environment, and is expected to have severe impacts on marine life. Shellfish such as shrimp, crabs, clams, and oysters are particularly affected by ocean acidification, and are important locally for both commercial and subsistence purposes. In Puget Sound, over 30% of the region's marine species are likely to be impacted by this phenomenon (EA Engineering, Science, and Technology, Inc., 2023). The local economy is also at risk, with around 2,000 jobs in the Squalicum and Blaine marinas alone relying on commercial fishing activities, which may be severely impacted by changes in fisheries populations. Recreational fisheries, which are important both for the recreational fishing opportunities they provide as well as providing additional jobs, are also vulnerable to the effects of ocean acidification. Furthermore, increased acidity levels may cause accelerated corrosion of submerged Port assets, posing a significant threat to infrastructure.

Goals and Strategies to Build Resilience to Climate Change Hazards

Climate Change Hazards Addressed:


Sea level rise and storm surge


Extreme temperatures


Intense rainfall and flooding


Wildfires and air quality


Coastal erosion and sedimentation


Ocean acidification

Despite the many climate change hazards facing the organization, it is possible for the Port to anticipate, prepare for, and effectively respond to the impacts of climate change. The following section presents the specific goals and strategies the Port intends to adopt and implement to fulfill its climate change resilience-building target: to anticipate, prepare for, and effectively respond to the impacts of climate change and collaborate with regional partners to protect and enhance the economy, community, and the environment through Port-wide climate change resilience programming efforts.

The climate change resilience-building goals and strategies in the following pages address the focus areas of Port governance, infrastructure, economic development, human health and safety, and the natural environment. These focus areas represent an intersectional approach to building climate change resilience within the economic, social, and environmental dimensions of the Port.

The suite of goals and strategies is directly informed by the results of the Port of Bellingham's Coastal Vulnerability Assessment as well as other local climate change resilience planning efforts and were determined in coordination with Port staff.

Building Resilience To Climate Change Hazards

GOVERNANCE

Goal 7: Institutionalize and prioritize climate change resilience across all Port divisions, processes, investments, and operations.

Institutionalizing and prioritizing climate change resilience across all Port divisions, processes, investments, and operations is essential for the Port to effectively prepare for the impacts of climate change. By integrating climate change resilience considerations into its governance and all aspects of its operations and using staff expertise, the Port can better protect its infrastructure, assets, and stakeholders from the risks posed by rising sea levels, increased storm surges, and other climate-related hazards.

Strategy 7.1: Understand and prepare for hazardous events, trends, or disturbances related to climate change.

Preparing for hazardous weather events, such as storms and floods, and other climate change hazards before they occur is crucial for building climate change resilience at the Port. By understanding the potential impacts of climate change on the Port and surrounding areas, the Port can develop strategies to mitigate the risks associated with climate change hazards.

Climate hazards addressed: 

Strategy 7.2: Model and monitor existing and future climatic conditions.

Understanding current and future climatic conditions provides valuable insights into how climate change may affect the Port and surrounding areas in the future. With up-to-date information and best available science, the Port can better understand its vulnerabilities and inform its management, operations, tenants, and planning efforts, allowing it to proactively prepare for climate change impacts.

Climate hazards addressed: 

Strategy 7.3: Address climate impacts in Port policies, plans, and guidelines.

Incorporating climate change hazards and impacts into key planning and design documents will help to ensure that the Port's investments and actions are resilient to changing climatic conditions. By integrating climate change considerations into overarching planning docu-

ments and design guidelines, the Port can effectively future proof its operations and infrastructure. Additionally, by including climate change considerations in planning documents and guidelines, the Port can demonstrate its commitment to sustainability and resilience and inspire other organizations to follow its lead in addressing climate change.

Climate hazards addressed: 

Strategy 7.4: Establish mechanisms to ensure accountability of Port divisions in implementing the Climate Action Strategy.

By establishing a robust accountability system including creation of a Climate Action Strategy Team with representatives from all Port divisions, the Port can stay on track to achieve its climate change targets, goals and strategies, while increasing transparency and promoting support and buy-in for climate action across all Port divisions. Creating a Climate Action Strategy Team can also help to facilitate cross-divisional collaboration, promote knowledge sharing and best practices, and encourage innovation and creativity in achieving the Port's climate goals.

Climate hazards addressed: 

Strategy 7.5: Coordinate with local and regional jurisdictions, agencies, and institutions to collaborate on climate change resilience-building actions.

Achieving successful collaboration across multiple jurisdictions, agencies, and institutions will enhance the Port's capacity for building climate change resilience, scaling adaptation efforts, and leveraging its own and partners' assets. By working together toward a common goal, the Port and its partners can pool resources and expertise, increase efficiency, and foster innovation and creativity in addressing climate change impacts. This collaborative approach also enables the Port to tap into diverse perspectives and knowledge, which can lead to more comprehensive and effective solutions to climate-related challenges. Moreover, by partnering with other organizations, the Port can share the costs and risks associated with climate change adaptation and create mutually beneficial relationships that support long-term sustainability and resilience.

Climate hazards addressed: 

INFRASTRUCTURE

Goal 8: Increase the resilience of Port infrastructure to changing climatic conditions.

Increasing the resilience of the Port's infrastructure to changing climatic conditions is crucial to ensuring that the Port of Bellingham can maintain its operations in the long-term, protect the safety of its employees and users, and minimize the risk of economic and environmental damage from climate change-related events.

Strategy 8.1: Prevent future development in areas vulnerable to climate change hazards.

A key aspect of building resilience is avoiding measures that increase the Port's vulnerability to climate change hazards now or in the future. In line with this, by avoiding building new infrastructure in areas that are vulnerable to climate change hazards, the Port can minimize the additional measures that it will need to take to protect or repair its infrastructure in the future. In instances where the Port does develop areas that are vulnerable to climate change hazards, prioritizing the adaptive capacity of the development will help to ensure that the infrastructure can withstand the challenges posed by these hazards, mitigating the risk of damage, disturbance, and loss.

Climate hazards addressed: 

Strategy 8.2: Protect existing shoreline and infrastructure at lower elevations from RSLR, coastal erosion and sedimentation, and riverine flooding.

The Port is taking steps to understand which areas of the shoreline and lower-elevation infrastructure are most vulnerable to the effects of storm surges, waves, and erosion and assessing options to mitigate risk. Installing or enhancing "soft-armored" or "living" shorelines where appropriate, shoreline armoring (e.g., bulkheads, riprap, or seawalls), and nature-based infrastructure (e.g., floodable parks, bioswales, and rain gardens) can help serve as a crucial line of defense against coastal hazards.

Climate hazards addressed: 

Strategy 8.3: Adapt existing and new infrastructure and operations to better withstand RSLR, storm surge, and flooding.

For existing infrastructure that is vulnerable to RSLR, flooding, and erosion, the Port will continue to assess whether to retreat or protect the infrastructure. If the decision is made to protect, the Port must carefully evaluate various protection methods to determine which options are most suitable for both present and future conditions. Adaptation measures range from elevating structures to implementing low-cost flood mitigation measures (e.g., dry floodproofing[4]) to closing low-lying parking lots during king tides or other high-water events.

Climate hazards addressed: 

Strategy 8.4: Relocate vulnerable facilities and operations to protected areas.

For facilities and operations that cannot be adapted to withstand these impacts, the Port may relocate the infrastructure to higher elevations. Although the upfront costs of such a move may be significant, it is important to weigh them against the potential costs of inaction or maladaptation of existing infrastructure. By taking a proactive approach and investing in relocating infrastructure, the Port can ensure the long-term safety and resilience of its assets in the face of coastal hazards. This can also help to minimize potential damages and costs associated with infrastructure failure or damage caused by these environmental risks.

Climate hazards addressed: 

Strategy 8.5: Prepare Port infrastructure for anticipated changes in weather patterns (e.g., more severe storms).

The Port's infrastructure is susceptible to damage and operational disturbances caused by increasingly severe and unpredictable weather patterns. To ensure climate change resilience, the Port is taking proactive measures to assess and plan for the current and future impacts of

4 Dry floodproofing is an option that can work to prevent flooding in buildings or areas minimally affected by nuisance floods. Dry floodproofing works by creating a watertight seal in the area to be affected by a flood. It prevents water from entering the area or building. Dry floodproofing is a relatively inexpensive option and can hold for an extended period of approximately 25 or more years. However, if sea levels were to continue to rise at an alarming rate, then a building treated with only dry floodproofing would be at considerable risk of flooding in a period shorter than the lifespan of the seal.

changing weather on its infrastructure. This approach involves prioritizing investments and improvements that enhance the Port's ability to withstand and recover from climate change impacts.

Climate hazards addressed: 

Strategy 8.6: Prepare Port infrastructure for coastal erosion and sedimentation hazards.

To protect the Port's infrastructure against the potentially devastating effects of coastal erosion and sedimentation hazards, the Port will undertake an evaluation of the potential risks posed by these hazards. The Port will use the information from the evaluation to prepare for these risks through a variety of measures, such as reinforcing the Port's infrastructure and establishing effective sediment management strategies.

Climate hazards addressed: 

Strategy 8.7: Evaluate and mitigate wildfire and poor air quality risk for Port assets.

To safeguard its assets against the growing threat of wildfires and the resulting smoke, the Port will undertake an evaluation of the potential risks posed by this hazard. The Port will use the information from the evaluation to guide the identification and implementation of actions that minimize the impact of wildfires and smoke on Port assets and operations both now and in the future.

Climate hazards addressed: 

ECONOMIC DEVELOPMENT

Goal 9: Support a local economy that is built upon sustainable practices and is resilient to climate change impacts.

By fostering a sustainable and climate change resilient local economy, the Port can reduce its environmental footprint and support the long-term economic stability and prosperity of the region. Additionally, supporting a sustainable and resilient local economy can enhance the Port's reputation and attract new businesses and investment opportunities.

Strategy 9.1: Build climate change resilience across the Port's existing economic network.

As a leading economic force in Whatcom County, the Port has a vital role to play in promoting climate change resilience among its partners and tenants. By taking steps to assess and communicate about the projected impacts of climate change to its economic network, the Port can help inform and guide its partners and tenants on how best to address climate change hazards that impact their businesses and operations.

Climate hazards addressed: 

Strategy 9.2: Support and expand climate change resilient businesses and economic opportunities around and within the Port.

In addition to supporting the climate change resilience of its existing tenants, the Port has an opportunity to recruit new tenants that are committed to sustainable practices and that can thrive in the face of changing climatic conditions. To achieve this, the Port can encourage and incentivize the creation, expansion, or relocation of businesses that are aligned with the principles of long-term sustainability and climate change resilience.

Climate hazards addressed: 

Case Study: The Port of San Diego's Blue Economy Incubator assists in the creation, development, and scaling of new water-dependent business ventures on San Diego Bay focusing on sustainable aquaculture and Port-related blue technologies. The incubator serves as an innovation launch pad, offering early-stage companies with key assets and support services focused on pilot project facilitation, including subject matter expertise, permit-ready infrastructure, entitlement assistance, marine spatial planning tools, market access, and funding.

HUMAN HEALTH & SAFETY

Goal 10: Protect and Enhance the Health of Port Employees, Tenants, and Other Facility Users in the Face of Changing Climatic Conditions.

Protecting and enhancing the health of Port employees, tenants, and other facility users in the face of changing climatic conditions is a priority for the Port. This involves developing and implementing measures to protect workers and users from exposure to extreme weather conditions, such as heat waves or heavy precipitation events, and to ensure clear communication regarding additional climate change

hazards. By prioritizing the health and safety of its employees and users, the Port can maintain a productive and healthy workforce, while also serving as a model for other local organizations.

Strategy 10.1: Support human health and safety during periods of extreme weather.

As part of its commitment to promoting the resilience and well-being of the local community, the Port has an opportunity to collaborate with local partners to identify and create safe and accessible community spaces in preparation for extreme conditions such as heat waves or poor air quality. This proactive approach will help to ensure that community members have access to necessary resources and support during times of crisis. By fostering a sense of shared responsibility and preparedness, the Port can help to build a stronger and more resilient community, one that is better equipped to cope with the challenges of a changing climate.

Climate hazards addressed: 

Case Study: The Port of Seattle's Smith Cove Blue Carbon Pilot Project is an initiative to restore and enhance coastal wetlands in the Smith Cove area, leveraging their natural ability to sequester atmospheric carbon. By utilizing native vegetation and specialized techniques, the project aims to maximize the wetlands' capacity to trap and store carbon, while also providing a range of additional ecosystem benefits, such as improving water quality and supporting fish and wildlife habitats.

Strategy 10.2: Prepare people and spaces for smoke.

Given the increasing frequency and severity of wildfires, the Port is taking steps to prepare its facilities and personnel to cope with the potential disturbances caused by wildfire smoke. By establishing dedicated "clean air" spaces and implementing effective air quality management strategies, the Port can limit operational disturbances and help to protect the health and safety of its workforce.

Climate hazards addressed: 

Strategy 10.3: Enhance emergency preparedness and response systems.

Effective emergency preparedness and response systems are essential for promoting community resilience and minimizing the potential damage and loss of life during disaster events. As climate change continues to intensify the frequency and severity of natural disasters, it's crucial that these systems are regularly updated and adapted to ensure they remain effective. By incorporating projected climate impacts into their emergency preparedness and response planning, the Port can ensure that it is well-equipped to respond to the challenges of a changing climate.

Climate hazards addressed: 

Goal 11: Support resilient and healthy natural systems within and around Port properties.

ENVIRONMENT

By implementing practices that promote the restoration and protection of natural systems within and around Port properties, the Port can enhance biodiversity and support the long-term resilience of the region to climate change. Additionally, protecting natural systems can provide important co-benefits, such as improving air and water quality, mitigating greenhouse gas emissions, and supporting recreation and tourism opportunities.

Strategy 11.1: Protect functions and values of aquatic habitats and environments.

By providing essential support to plant and animal species that are threatened by the escalating pressures from climate change and other environmental stressors, the Port can help to preserve the functions and values of aquatic habitats and environments that are central to its economic, cultural, and environmental values.

Climate hazards addressed: 

Strategy 11.2: Support the Enhancement of coastal wetlands in the region.

Coastal wetlands play a pivotal role in safeguarding shorelines against the forces of coastal erosion, tidal and wave action, and storm surges. Through incentives and/or financial and

technical support for projects that improve and expand existing wetlands in the region, the Port can help to shield coastal infrastructure from the impacts of RSLR, while mitigating climate change, sustaining the diversity of plant and animal life, and enhancing water quality.

Climate hazards addressed: 

Strategy 11.3: Promote resilient vegetation that can withstand changing climatic conditions.

Unpredictable and severe weather patterns, such as prolonged summer droughts and heatwaves, impose unprecedented levels of stress on ecosystems. By investing in vegetation that is well adapted to drought conditions, the Port can help support a natural ecosystem that is better equipped to withstand and counteract the impacts of climate change-related stressors.

Climate hazards addressed: 

Section 4. Port Economic Development Opportunities For Energy Transition And Supporting Innovation

Table 4 reflects a summary of potential investments and other actions that can support the economic development of the Port of Bellingham and the region while also pursuing climate action and meeting the goals of the Climate Action Strategy.

Table 4: Economic Development Opportunities for Energy Transition

#	Opportunity
1	Support electrification of harbors and vessels, invest in needed infrastructure and encourage adoption.
2	Target a portion of the Port's Revolving Loan Funds for carbon reduction and climate change resilient businesses.
3	Utilize creative real-estate opportunities available to the Port to encourage and support climate-friendly business development locally.
4	Include a climate layer to inform vulnerability of infrastructure and better plan for resilient projects in the Whatcom County Infrastructure, Property and Resiliency Database.
5	Utilize Foreign Trade Zones to attract businesses to the region that will further the carbon reduction and climate change adaptation strategies.
6	Work with PSE and the State of Washington to increase net metering opportunities to enable hosting community solar projects on Port sites.

Table 5 includes a variety of funds (grants, strategic reserves, etc.) that the Port could leverage to implement the goals and actions contained in the Climate Action Strategy. These may be specific to the Port's Economic Development division.

Table 5: Potential Funding Mechanisms for CAS Implementation

Funding Source	Description
Misc. grants (Ecology, EPA, FEMA, WA EMD)	The Port may be able to access grants that others cannot due to the Special Purpose District status.
Strategic Reserve Funds (SRF)	These are pass-through grants focused on quality job creation and green technology. (Ex: Vicinity Motor Company's bus electrification in Ferndale). Biennial funds from unclaimed lotto winnings are targeted for business recruitments in the Governor's strategic industries.
Revolving Loan Fund	Managed by Economic Development Staff, these funds exist to diversify the manufacturing job base in Whatcom County. Ranging from $50-$100k, they are intended for businesses unable to procure other funds and/or need gap financing to assist with commercial bank participation. It is a small funding pool (current amount is $90K but it varies).
EDI County Tax Funds (0.09%)	These funds can be used primarily for publicly owned and operated infrastructure projects, especially those that benefit affordable/workforce housing. Projects need to have a regional impact; there are no climate-specific requirements. The Port's Director of Economic Development and a Port Commissioner sit on the EDI board. Rules would need to be further amended to make projects more climate friendly or to prioritize climate projects.
Foreign Trade Zones	These can be established anywhere in the County (except Sumas) at a business' request and expense. Business is responsible for operation of the Zone and meeting all operational and financial requirements. Zones can be beneficial to companies that are importing certain products that they intend to turn around and export, assemble finished goods using imported parts and long-term storage among other things. These benefits are determined by the original duties that would be charged on imported items and what the volume of imported goods is. FTZ Counsel is typically used to set up FTZs.

Funding Source	Description
Federal Opportunity Zones	The benefits of this funding source is that it focuses on three economically distressed areas, one of which is the Bellingham Waterfront (the others are Lummi Nation and another COB city limit area/WWU area). Target beneficiaries are those who have money to invest as some portion is tax-free for up to 10 years, and it is supposed to help those living and working in the federally identified distressed areas.
Port Industrial Development Corporation (IDC)	The IDC is a separate public corporation formed by the Port of Bellingham Commission in 1982. Its primary purpose is to issue tax exempt non-recourse financing or Industrial Revenue Bonds (IRBs) to finance industrial development facilities within Whatcom County. Eligible facilities include manufacturing, transportation, airports, docks/wharves, processing, solid waste or industrial sewage facilities. Over $232 million in IRBs has been issued through 2009. However, the low long-term interest rate environment has diminished demand for IRBs and the Port has not issued a bond since then.

Section 5. Collaboration Opportunities

Implementing the Climate Action Strategy will require close collaboration both internally (with key Port division managers and staff with implementation responsibilities) and externally (with partner entities – public, private and not-for-profit - both locally and regionally). Potential partners are listed in Table 6, though others likely exist.

Table 6: Potential Partners

Entity	Opportunity to Collaborate
Internal	
Port Commissioners	♦ Brief on CAS progress on an annual basis at a minimum or more frequently as needed; engage as appropriate in annual discussions to identify gaps in CAS and prioritization effort for Port Strategic Budget development.
Executive and Directors	♦ Engage annually in Climate Action Strategy review process and identifying gaps in the actions and prioritization efforts for Port Strategic Budget development.
Port staff	♦ Engage as appropriate in regular Climate Action Strategy implementation, review process and identifying gaps in the actions and prioritization efforts for Port Strategic Budget development.
External – Public Entities	
City of Bellingham	♦ Work with COB on fleet electrification; investigate partnering in an EV group buy program or grant opportunities to drive down costs of individual vehicles. ♦ Discuss success stories and strategies with COB on climate actions the Port plans to engage to identify synergies. ♦ Continue adaptation and resiliency project conversations and coordination to broaden the Port's regional impact. ♦ Collaborate on identifying local sources of renewable energy.

Entity	Opportunity to Collaborate
Whatcom County	♦ Coordinate with Whatcom County staff on Port climate-related efforts. If a County Office of Climate Action is established, as called for in the 2021 Whatcom County Climate Action Plan, Port staff should regularly coordinate with staff in this office. ♦ Participate in collaborative projects across Whatcom County such as the County's efforts to support the Small Cities of Whatcom County to incorporate climate change resilience in local comprehensive plans, a project completed in 2021 in partnership with Western Washington University's Sustainable Communities Partnership. Additionally, participate in projects such as updates to climate chapters for both City and County Comprehensive Plans. ♦ Work with the County to expand electric vehicle charging infrastructure. ♦ Coordinate with the County as they create a climate-resilient regulatory framework for new development. Apply this framework to future Port development.
Whatcom Transportation Authority	♦ Support WTA's Sustainability Plan. ♦ Collaborate on improved public transportation for Port employees to reduce commuting greenhouse gas emissions. ♦ Coordinate with WTA staff on Whatcom County wide sustainability efforts such as Electric Vehicle charging infrastructure.
External – Tribes	
Lummi Nation	♦ Acknowledge different ways of knowing and shared strategies for identifying and addressing common goals as identified in the Lummi Nation Climate Change Mitigation and Adaptation Plan, such as: ♦ Reducing the risk of property damage from coastal flooding and shoreline erosion. ♦ Maintaining and enhancing coastal wetland habitats. ♦ Reducing contributions to ocean acidification. ♦ Support Lummi Nation's own priority climate planning actions.
Nooksack Indian Tribe	♦ Identify methods to engage in information sharing to address shared goals, a priority identified in the Nooksack Indian Tribe's Climate Change Adaptation Plan. ♦ Acknowledge different ways of knowing and engage tribal scientists/policy makers when making development decisions that may impact landscape connectivity. ♦ Support the Nooksack Indian Tribe's own priority climate planning actions.

Entity	Opportunity to Collaborate
External - Other	
Joint Climate Action Team (JCAT)	♦ Continue to participate in JCAT meetings and projects with staff from Whatcom County, the City of Bellingham, and others, as relevant.
Local Sustainability Campaign support	♦ Continue to support local efforts to reduce waste and reduce carbon emissions.

In addition to collaborating with these entities, it will be important to engage with a variety of other community interests such as the agricultural and fishing industries.

Section 6. Implementation, Tracking, And Reporting

Successful implementation of the Climate Action Strategy will require ongoing leadership, coordination, commitment, and innovative approaches to financing and budget management.

Recommendations for Successful Implementation

Recommendations for successful implementation of the Strategy addressing a variety of categories, including communications, planning, community engagement, training and tracking and reporting are included in Table 7.

Table 7: Recommendations for Successful implementation of Climate Action Strategy

Category	#	Recommendation	Frequency
Communications with Port Leadership and Management	**1**	Quarterly or annual reporting on progress toward accomplishing the targets and goals of the Climate Action Strategy, as well as challenges, to Commissioners and Division Managers. Commissioners should be briefed on progress on all aspects of the Strategy; Division Managers should be briefed on relevant aspects of it for their work (for example, the Aviation Division Managers should be briefed on Mitigation progress; Maritime Division Managers on Adaptation/Resilience progress.	Quarterly or Annually

Category	#	Recommendation	Frequency
Planning	2	Conduct GHG Inventory.	Annually
	3	Convene Executive and relevant Division Directors and Port leadership to review progress-to-date on achieving CAS targets, goals, strategies, as well as actions from previous year. Address gaps in the identified strategies and actions and prioritize actions for the next fiscal year.	Annually or as needed
	4	Develop a prioritization matrix and process to identify the following fiscal year's priorities.	Annually
	5	Establish an internal Climate Planning Team with representatives across key Port divisions and leadership that meets quarterly to 1) review progress to date on implementation, 2) identify gaps in implementation of actions and recommend strategies to address gaps, 3) lead communications and engagement processes, and 4) hold annual prioritization meetings for each fiscal year's actions.	Quarterly
	6	Ask staff to recommend priority actions for the following fiscal year during Port's annual budget review and Commission approval process.	Annually

Category	#	Recommendation	Frequency
Key Partner and Community Engagement; Communications	7	Maintain the CAS webpage within Port's website; keep the website updated and highlight key accomplishments toward achieving the targets.	Monthly
	8	Invite regular input from Port partners and stakeholders via individual and group meetings, workshops, etc.	Quarterly or Annually
	9	Inform the community at key milestones (e.g., achieving a target, goal, or important action)	As needed (coinciding with key milestones)
	10	Identify and engage with stakeholders experiencing disproportionate impacts from climate change (e.g., Port tenants in locations identified as highly vulnerable)	As needed
	11	Meet with other local agencies and organizations to share information on successful strategies and ongoing collaboration opportunities.	As needed
	12	Present regularly at Port Commission Meetings to provide updates to the commissioners and the public on progress toward meeting goals.	Quarterly or annually
	13	Continue participating in Joint Climate Action Team (JCAT) meetings and projects with staff from Whatcom County, the City of Bellingham, and others, as relevant.	As needed
Training	14	Develop and implement staff training as needed to implement priority actions, including training for lead staff for Climate Action Strategy to connect with colleagues elsewhere and attend trainings.	As needed

Category	#	Recommendation	Frequency
Tracking and Reporting	15	Conduct an updated greenhouse gas inventory and tracking additional performance metrics (e.g., improving drainage, installation of solar panels, storm-proofing buildings, commuting habits of staff).	Annually
	16	Provide a sustainability report describing implementation efforts underway and those completed. Management may use this reporting to manage and adjust expectations, to define workload assignments, and develop capital and operating budgets for the coming year.	Annually

Moving from Strategy to Action

To move from strategy to implementation, the Port will need to identify specific actions to prioritize and pursue each year. Appendix A includes a list of actions that have already been prioritized and included in the 2023 budget and employee workplans. The Port will need to continue to identify and prioritize actions on an annual basis to ensure that progress toward the goals included in this Strategy is maintained. In addition to this Strategy, the Port has developed and will regularly update an internal database of potential climate actions relating to the goals and strategies in the Strategy.

Recommended Approach To An Annual Review And Prioritization Process For Actions

A possible process that the Port can use to identify and prioritize actions to fulfill the goals and strategies outlined in this document include:

1. Establish a climate action team consisting of representatives from different departments across the Port, including operations, maintenance, finance, and sustainability.
2. Have a facilitated meeting with climate action team members and others as needed to review and update the Port's internal list of potential climate actions that could help the Port achieve its climate change mitigation and resilience-building goals. Additional actions should be based on the latest scientific research, technological developments, funding opportunities, and best practices.
3. Evaluate the potential effectiveness, feasibility, and cost of each measure, considering factors such as emissions reduction potential, vulnerability rating, implementa-

tion complexity, and funding availability.

4. Bring together climate action team members to prioritize the actions based on their potential impact, cost-effectiveness, and feasibility. This could involve assigning scores or weights to each measure based on specific criteria and then ranking them accordingly.
5. Develop an annual action plan that outlines the prioritized actions, along with timelines, responsible departments, and funding sources.
6. Incorporate these actions into the annual budget and departmental workplans. This will allow the actions to be integrated into Port operations and functions.
7. The climate action team should regularly monitor and report on progress toward achieving the Port's climate change mitigation and resilience-building goals.
8. Review and update this Climate Action Strategy on a regular basis to ensure it remains aligned with the Port's evolving needs and the latest climate science.

Adaptive Management

The Port is committed to implementing an adaptive management approach to the Strategy. Adaptive management promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. This will involve regularly monitoring and evaluating the effectiveness of the Strategy, as well as being flexible and responsive to changing conditions, new information, and evolving technology. Elements of adaptive management are already incorporated throughout the Strategy, including (but not limited to) recommendations for annual processes to prioritize actions to achieve goals, and update and make improvements to the greenhouse gas inventory.

Port of Bellingham Divisions and Roles/Responsibilities

Successful implementation of the Strategy will involve all of the Port's operations. Table 8 summarizes general roles and responsibilities for Port divisions related to the Climate Action Strategy.

Table 8: Port Divisions and Roles and Responsibilities Related to the Strategy

Department/Division	Emissions Reduction	Resilience Building	General Roles and Responsibilities
Aviation (Bellingham Airport)	X		Bellingham International Airport
Commissioners	X	X	Adopt CAS by resolution and approve annual budget
Economic Development	X	X	County Regional Economic Partnership
Emergency Management		X	Natural Hazard Mitigation Plan
Environmental and Planning Services	X	X	Strategy Development and Implementation
Executive	X	X	
Finance	X	X	Strategic Budget
Marine Terminals ()	X	X	Shipping terminal, cruise terminal
Marinas	X	X	Squalicum and Blaine Harbors
Community Outreach	X	X	Social Media and Events
Real Estate	X	X	Port Tenants and Property Development
Public Affairs	X	X	Government Relations
Maintenance	X	X	Port Facilities and Open Spaces

This plan is a living document. The challenge of climate change is complex and evolving and will require annual review and adjustments of targets, goals, strategies, and actions. Being

flexible will be key to the Port's ability to achieve its ultimate vision of being a regional leader in sustainable economic growth while achieving GHG emission reduction targets and operational resiliency.

Section 7. Conclusion

With the adoption of the Climate Action Strategy, the Port of Bellingham positions itself as a leader among mid-sized ports in proactively mitigating and building resilience to the effects of climate change. It has now joined the ranks of a small number of ports in Washington that have adopted climate action planning documents, marking a significant step in its climate action pursuit.

The Strategy will serve as a guiding document that supports the Port's overall mission and regional identity. Achieving the targets and goals of reducing emissions and building resilience to climate change hazards will ensure the Port's continued role as an economic engine for Whatcom County. The contents of the Strategy will give clear direction and vision to Port commissioners, staff, and key partners and will help guide decision-making.

Among the key findings of the greenhouse gas inventory and Vulnerability Assessment, key pieces of technical work that informed this Strategy, include:

- In 2019, the Port of Bellingham's emissions totaled 5,687 metric tons of CO_2e, with buildings and energy supply contributing the most emissions.
- The Bellingham shoreline could see one meter of RSLR between 2083 and 2119.
- Four areas of the Port that are currently at most risk of flooding, include:
    - Squalicum Parkway Industrial Area
    - Bellingham Shipping Terminal Area
    - Marine Trades Area by the I & J Waterway
    - The Fairhaven Marine Industrial Park
- A methodology for assessing these highly vulnerable areas to better understand the impacts to specific Port assets has been developed and refined; this approach can be used as a framework to help the Port quickly prioritize its most vulnerable assets and take preventive measures to protect them before it is too late.

By pursuing the goals and strategies included in this Climate Action Strategy, the Port can take meaningful action to reduce its GHG emissions and help to mitigate climate change while building its resilience to climate change impacts.

Implementation of the Strategy will affect all aspects of the Port's operations and will need to align with other related plans and processes. It must extensively engage stakeholders and partners to continue building buy-in and support, as well as pulling in partners to advance actions.

Finally, the Strategy will ensure that the Port is aligned with regional governments that have taken steps to develop similar plans, including WWU, the City of Bellingham, Whatcom County and Lummi Nation. This work, especially the extensive, recent efforts by the City of Bellingham and Whatcom County, informed the Port's own Strategy. However, the Port's Strategy reflects its unique role within the community as a driver of economic development and job growth. This Strategy enables the Port to define a clear, visionary path to a sustainable economic and environmental future.

References

Cascadia Consulting Group. (2020). Whatcom County Climate Action Plan: Summary of Observed Trends and Projected Climate Change Impacts. https://www.whatcomcounty.us/DocumentCenter/View/53837/Whatcom-County-Climate-Science-Summary-2020

City of Bellingham. (2019). Waterfront District Subarea Plan. https://cob.org/wp-content/uploads/waterfront-final-subarea-plan.pdf

Cogent Environmental Consulting. (2020). Results of Port of Bellingham's 2019 Greenhouse Gas Inventory. https://www.portofbellingham.com/1007/Key-Work-Products

EA Engineering, Science, and Technology, Inc. (2023). Port of Bellingham Coastal Vulnerability Assessment. https://www.portofbellingham.com/1007/Key-Work-Products

EcoNorthwest. (2019). Port of Bellingham Roadmap to a Climate Action Plan. https://www.portofbellingham.com/DocumentCenter/View/9496/PoB_Climate_Roadmap-Final

IPCC. (2023). Summary for Policymakers. In: Climate Change 2023: Synthesis Report. A Report of the Intergovernmental Panel on Climate Change. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland.

Littell, J. S. (2012). Northwest Chapter, in Effects of Climatic Variability and Change on Forest Ecosystems: A Comprehensive Science Synthesis for the U.S. Forest Sector,.

Morgan, H.A., Bagley, A., McGill, L., Raymond, C.L. 2019. Managing Washington Wildfire Risk in a Changing Climate. Workshop summary report prepared by the Northwest Climate Adaptation Science Center and the Climate Impacts Group, University of Washington, Seattle.

NOAA, N. O. and A. A., Sweet, W. V., Kopp, R. E., Weaver, C. P., Obeysekera, J., Horton, R. M., Thieler, E. R., & Zervas, C. (2017). Global and Regional Sea Level Rise Scenarios for the United States. (NOAA Technical Report NOS COOPS 083. NOAA/NOS Center for Operational Oceanographic Products and Services.).

Snover, A., Raymond, C., Roop, H., & Morgan, H. (2019). No Time to Waste. The Intergovernmental Panel on Climate Change's Special Report on Global Warming of 1.5 C and Implications for Washington State. University of Washington Climate Impacts Group, Seattle.

Whatcom County. (2021a). Whatcom County Climate Action Plan. https://www.whatcomcounty.us/DocumentCenter/View/61403/CAP-Final--20211022-ver2

Whatcom County, S. D. of E. M. (2021b). Whatcom County Natural Hazards Mitigation Plan. https://www.whatcomcounty.us/3914/2021-Natural-Hazards-Mitigation-Plan

Appendix A. 2023 Climate Actions List

Examples of GHG emission reduction and resilience-building actions that have been approved in the 2023 budget are included in Table 9.

Table 9: 2023 Climate Actions List for GHG Emissions Reduction

Strategy	Action	Relative 2023 Budget Amount ($-Low Cost, $$-Medium Cost, $$$-High Cost); FUNDING SOURCE
Strategy 1.1: Enhance the energy efficiency of Port buildings and operations through the implementation of innovative technologies, best practices, and policies.	Continue transition to energy-efficient lighting in all buildings by 2025 by completing inventory of remaining work and replacing lighting.	$$ (not including rebates and incentives and lower electricity costs); CAPITAL
	Complete a major lighting replacement project at the Bellingham International Airport terminal, from design to installation.	
	Conduct energy audits to prioritize actions to comply with the Clean Buildings Act and any other "low fruit" actions.	
	Develop tracking systems for energy savings from efficiency projects.	In house
Strategy 1.2: Maximize renewable energy production and use through the deployment of innovative technologies, partnerships, and policies.	Complete an inventory of Port-controlled natural gas HVAC and DHW equipment.	$; OPERATING
	Pursue three separate feasibility studies for solar installations around the Port.	
Strategy 1.3: Transition from natural gas-powered equipment to efficient, electric equipment in port buildings.	Replace natural gas HVAC and DHW equipment with highest-efficiency electric alternatives at end of life or when performance- and cost-effective. In 2023, begin with any projects on the 5-year CIP budget.	$$$; OPERATING

Strategy	Action	Relative 2023 Budget Amount ($-Low Cost, $$-Medium Cost, $$$-High Cost); FUNDING SOURCE
Strategy 2.1: Expand electric vehicle charging opportunities across port workstations.	Install two Level 2 charging stations for fleet vehicles at primary Port workstations. Identify other priority areas.	$$; Prioritizing = OPERATING
Strategy 2.2: Transition from fossil fuel powered vehicles to cleaner modes of travel for on-road vehicles, as technology permits.	Adopt a policy to replace 100% of light-duty ICE vehicles with EVs at point of replacement or as funding becomes available.	$$ (slightly more than BAU but less Mx and gas costs over time); OPERATING
	Pilot use of EV medium-duty vehicles, including light-duty trucks and vans.	
Strategy 2.5: Provide electric vehicle- and efficient-driving education and training opportunities for port employees.	Adopt and communicate a no-idling policy for Port-owned vehicles.	In house
	Incorporate EV driver training as part of Port employee onboarding and regular training. Training should cover how to charge and drive electric fleet vehicles.	In house
	Incorporate efficient driver training as part of Port employee onboarding and regular training. The training should promote no-idling and low acceleration practices to reduce fuel consumption.	In house
Strategy 3.4: Support employee transition to electric vehicles.	Expand charging infrastructure available to (or reserved for) employees. 6 stations in 2023.	$$$; CAPITAL
Strategy 4.1: Establish and implement an emissions tracking system and process.	Conduct a 2022 GHG Emissions Inventory	$; OPERATING

Strategy	Action	Relative 2023 Budget Amount ($-Low Cost, $$-Medium Cost, $$$-High Cost); FUNDING SOURCE
	Complete another Exposure, Sensitivity and Adaptive Capacity Analysis (ESA) of Port properties/facilities, beginning with those that are likely more vulnerable, as defined in the 2022 Port of Bellingham Coastal Vulnerability Assessment (e.g., Lower Squalicum Creek and surrounding areas).	
	Integrate climate-related risks and adaptation efforts into the operating and capital budgets and the 5-year capital improvement plan.	

Appendix B. Summary of 2019 GHG Emission Inventory Results

Table 10: Summary of Scopes 1- 3 CO_2e Emissions from Port of Bellingham's 2019 GHG Emissions Inventory (Cogent Environmental Consulting, 2020)

SCOPE	SOURCE TYPE	SOURCE	USAGE	UNITS	EMISSIONS in MT CO_2e
1	**Stationary**	Natural Gas Use in Buildings	74,448	therms	395
	Mobile	Gasoline use in fleet	15,929	gallons	142
		Diesel use in fleet	1,588	gallons	16
		Total Fleet Fuels	**17,517**	**gallons**	**158**
	Fugitive Emissions	R-134a leaks from buildings and fleet	2	pounds	1
		R-422b leaks from buildings and fleet	42	pounds	44
		Total Refrigerants	**44**	**pounds**	**45**
	Biogenic (a)	B100 equivalent used in fleet	3	gallons	-
				Scope 1 total	**598**
2	**Indirect Energy**	BPA Electricity use	1,820,651	kWh	23
		PSE Electricity use	9,199,794	kWh	4,888
		Total Electricity	**11,020,445**	**kWh**	**4,912**
				Scope 2 total	**4,912**
3	**Miscellaneous**	**Employee Commutes**	**19,878**	**gallons**	**177**
				Scope 3 total	**177**
TOTAL EMISSIONS					**5,687**

Appendix C. Coastal Climate Change Hazards

Table 11: Coastal climate change hazards facing the Port of Bellingham (EA Engineering, Science, and Technology, Inc., 2023)

Hazard	Description of Hazard	Port Assets	Data Gaps	Recommendations
Relative Sea Level Rise	♦ Increases in sea level are occurring as a result of climate change. ♦ Changes in sea level will impact the rate and severity of the occurrence of the other hazards listed in this table. ♦ Increases in sea level will increase the rate of corrosion of any partially submerged infrastructure (e.g. docks, piles, pile caps, and beams). ♦ Increases in sea level will reduce the rate at which stormwater is able to drain from Port facilities, causing increased flooding due to precipitation events. This is known as compound flooding. ♦ Storm surge damage to Ports will increase due to RSLR. ♦ Some Port facilities may be subject to permanent inundation, depending on the degree of RSLR. ♦ Port facilities subject to more frequent or permanent inundation may be more vulnerable to corrosion due to increased ocean acidification.	♦ Extensive studies have been carried out nationwide due to the severity of the hazard. This results in readily available data for the Port to use.	♦ Long-term water level record specifically located within the Port. ♦ Not a major gap as nearby locations can be used to provide reasonable estimates.	♦ Continue to monitor RSLR guidance as the science evolves. ♦ Consider installing a water level sensor to collect long-term trends at the Port.

Hazard	Description of Hazard	Port Assets	Data Gaps	Recommendations
Changes in Weather Patterns	♦ Transportation and shipping services may be interrupted by more intense and more frequent storms. ♦ Future coastal and inland flooding may increase due to climate change. ♦ Increased wind speeds may threaten infrastructure.	♦ The Port has contributed to the PS-CoSMoS work that models coastal storms, taking into account potential changes in weather patterns.	♦ No gap, final PS-CoSMoS outputs should account for this.	♦ Continue to revise analyses and port planning strategies as new results become available.
Coastal Erosion/ Sedimentation	♦ RSLR and changes in weather patterns are expected to lead to changes in coastal erosion and sedimentation, potentially threatening port infrastructure and/or shipping channels. ♦ More frequent intense precipitation events in combination with development in coastal watersheds may increase sediment loads entering Bellingham Bay and other areas of Puget Sound.	♦ Limited erosion hazards have thus far been identified on Port properties (at Squalicum and Blaine), and Port Engineering and Facilities leads are aware of this hazard. The Whatcom County NHMP considers this concern not applicable to the Port under current conditions.	♦ Historical shoreline change rates. ♦ Sediment transport rates in coastal watersheds. ♦ Estimates on RSLR and storm-induced shoreline change will be incorporated in the final PS-CoSMoS results. ♦ Port currently relies on others to raise awareness of any erosion issues.	♦ Analyze shoreline change trends using historic aerial imagery. ♦ Analyze sediment transport rates in the watershed under both current and projected climate change conditions to determine how sediment transport rates to the Bay of Bellingham and other Port harbors will change. ♦ Use sediment transport analysis.

Hazard	Description of Hazard	Port Assets	Data Gaps	Recommendations
Flooding	♦ Climate change may lead to a greater frequency of intense precipitation events, increasing the risk of flooding. ♦ Increases in sea level will reduce the rate at which stormwater is able to drain from Port facilities, causing increased flooding due to precipitation events. This is known as compound flooding. ♦ Port facilities subject to more frequent or permanent inundation may be more vulnerable to corrosion due to increased ocean acidification.	♦ The Port has contributed to the PSCoSMoS work that models coastal storms, considering the impacts of climate change.	♦ Impacts of erosion combined with flooding, will be available once final PS-CoSMoS results are ready. ♦ Impacts of combined inland and coastal flooding across the Port, will be available once final PS-CoSMoS results are ready. ♦ While flood mitigation actions on a 2-5 year timescale are identified in the Whatcom County NHMP5, progress on these actions is unknown.	♦ Continue to update analysis as new model results become available. ♦ Use results to begin planning mitigation/adaptation strategies for the most at risk areas.

Hazard	Description of Hazard	Port Assets	Data Gaps	Recommendations
Ocean Acidification	♦ It is possible that increased ocean acidification may increase corrosion of submerged port assets. ♦ Ocean acidification results from the absorption of carbon dioxide, and has been accelerated by human-produced carbon emissions. ♦ Ocean acidification is detrimental to many marine shellfish species and will impact >30% of Puget Sound's marine species. Based on 2013 data, approximately 2,000 jobs rely directly on commercial fishing activities at the Squalicum and Blaine marinas alone. These jobs are vulnerable to changes in commercial fisheries populations. Additional jobs depend on recreational fisheries, which may also be impacted by climate change.	♦ Requires further investigation in future stages of Climate Action Strategy implementation.	♦ Inventory of infrastructural assets that will be vulnerable to ocean acidification. ♦ Assessment of impacts of ocean acidification on marine wildlife and the economic impacts on commercial and recreational fisheries.	♦ Evaluate the impacts of ocean acidification on marine wildlife and Port infrastructure.