

SECTION 5 | IMPLEMENTATION

Section 3 and Section 4 lay out the strategies needed to chart the course toward the Port's 2030 GHG reduction targets and the 2020 Strategy vision to phase out emissions by 2050. The journey to implement the strategies will require leadership, focused resources, and accountability. This Section discusses how the Port will implement the Plan given the challenges of the COVID-19 pandemic and the need for collaboration across the Port and throughout the port network. It discusses preliminary cost estimates and the different frameworks the Port will utilize to prioritize action to ensure sustainable, cost-effective, and equitable outcomes are realized. Lastly, it outlines the data and reporting metrics the Port will use to track and share its progress.

Impacts of COVID-19 on Implementation

The COVID-19 pandemic immediately changed the Port's day-to-day operations and its lines of business. These changes will influence air pollutant and GHG emissions in varying ways. Some examples include:

- All cruise sailings at the Port were canceled for the 2020 cruise season. Cruise operations returned in 2021 for a shorter season from July to October. It is unclear how ongoing COVID-19 risk and public health restrictions will impact future cruise seasons and projected growth in the Seattle-Alaska cruise market.
- Possible long-term impacts to cruise operations would affect emissions forecasts for cargo-handling equipment, trucks, and ground transportation associated with cruise operations. Other areas of Port maritime business, including grain cargo, commercial fishing, and recreational boating remain steady.
- Fewer employees are working onsite in Port buildings and worksites, which will result in reduced fuel use by fleet vehicles, lower solid waste volumes, and reduced plug loads and reduce heating and cooling requirements in Port buildings.
- Most telework-eligible employees are working from home at least part-time, which has proven the effectiveness of telework. As a result, the Port will expand its program on flexible work arrangements. However, for employees that do need to commute to a work location, the Port is recommending employees drive single-occupancy vehicles and avoid public transit for safety reasons, which is contrary to best practices to reduce employee drive-alone rates.
- Increasing the use of flexible work arrangements could result in permanent changes in how the Port uses its buildings and manages its fleet.
- There is an increased focus on building design and operating parameters to protect employee health. Adjustments such as increasing ventilation and outside air levels, extending operating hours, and reducing occupancy pose new challenges for energy conservation.
- With atypical use at Port facilities in 2020, 2021, and possibly extending further, the Port has estimated electricity meter readings of its submeters and delayed conducting additional waste audits at facilities in the Maritime Solid Waste Management Plan.

The impact of the pandemic on the Port's emission forecasts is unknown. Emissions forecasts and Plan recommendations will be updated as new information becomes available.

More significant is the pandemic's impact on Port revenue and regional economic growth. A prolonged pandemic and recovery could make it harder for the Port and maritime industry to make the investments needed to achieve the Plan's objectives.

Roles, Responsibilities, and Collaboration

The Port has indirect control over the Maritime Activity emissions associated with ships, harbor vessels, trains, and equipment. While the Port can leverage lease terms and tariffs to require action, collaboration, partnerships, funding support, or joint programs will be essential to achieve the 2050 vision.

The Port's internal roles and responsibilities include:

- **Port Executive Leadership** involvement is critical to advocate for investments and sponsor projects that align with the recommended actions in this Plan.
- **The Maritime Environment & Sustainability Department** will coordinate Plan development, implementation, updates, monitoring, and reporting.
- **Other Port departments** will be instrumental in developing strategies putting them into their capital budgets to drive action, including Marine Maintenance; Seaport Finance; Seaport Project Management; Capital Services; Economic Development; Asset Management and Real Estate; External Relations; Human Resources; Office of Equity, Diversity, and Inclusion; and others.

The most important aspect of implementation, however, is collaboration. The Port cannot fully implement the Plan alone. Collaboration throughout the region and with a coalition of partners is essential. The Port will continue to collaborate with the NWSA, Port of Tacoma and Port of Vancouver (Canada) to implement the 2020 Strategy. Collaboration with NWSA is particularly important for coordinated engagement and action on the SWCES and in the Duwamish Valley where NWSA-operated container cargo terminals in Elliott Bay are a source of local air emissions.²³

The Port will also continue to engage partners and support partner-led efforts across the port network, including with port tenants, industry, governments, non-governmental organizations, and near-port communities.

Engagement on Implementing the Plan

As the Port works to implement the strategies and actions identified in the Plan, ongoing engagement with tenants, industry, and near-port communities is critical to successful implementation.

Industry engagement

Engagement with Port tenants, terminal operators, and maritime industries is a key focus of implementation. The Port will work with equipment owners and operators to understand energy requirements, infrastructure needs, and technology constraints. Industry engagement is also an

²³ These operations were formerly managed by Port of Seattle but are now overseen by NWSA.

opportunity to identify leaders willing to work with the Port to advance the Plan through zero-emission technology pilots, early investments in clean technologies and by sharing lessons learned with others.

Community engagement and partnership

As discussed in the Introduction, near-port communities bear a disproportionate burden of air pollution exposure and environmental health disparities. In Seattle, this disproportionate burden is particularly evident in the Duwamish Valley, where the life expectancy of residents is over a decade shorter than that of wealthier neighborhoods in north Seattle.²⁴ When implementing the Plan, the Port will work with the Port Community Action Team, community organizations, and others to identify an equitable and accessible process to continue to engage and involve near-port communities, promote community capacity-building, identify community-based performance metrics related to the Port's plans, and build accountability and transparency around actions, investments, and outcomes.

To advance this commitment, the Port will take the following actions in collaboration with the NWSA and Port of Tacoma:

- Produce and broadly disseminate a regular update on clean air strategy implementation, beginning in the first quarter of 2022
- Support the completion and amplification of a "Clean Air & Climate Community Resource Guide" let by the NWSA by September 2022
- Collaborate with near-port residents and communities to develop and begin implementation of on-going engagement and partnership program by the end of 2022

Prioritizing Actions for Implementation

Actions proposed in the Plan will be evaluated and prioritized for implementation based on equity impacts and benefits, sustainability, and cost, as described below.

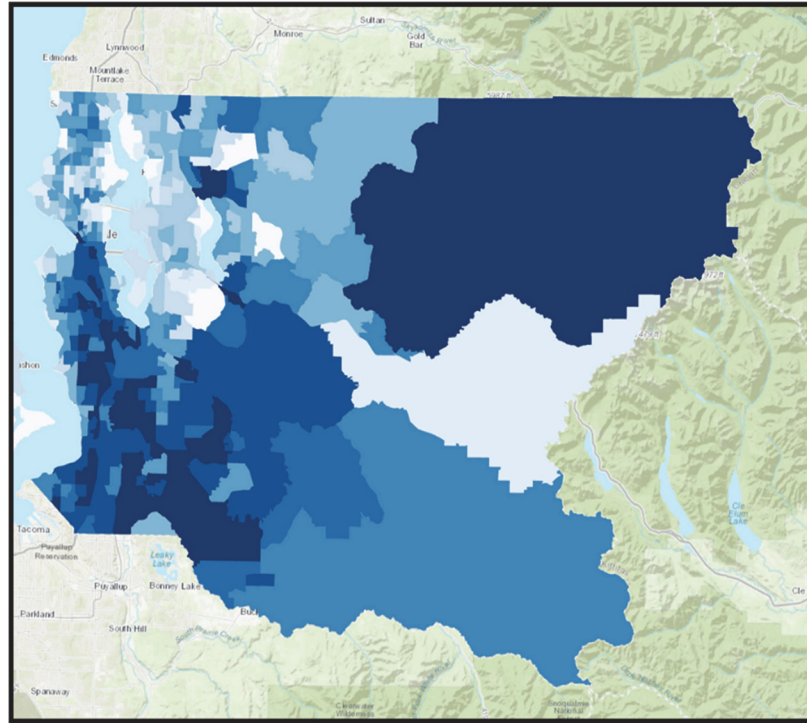
Sustainable Evaluation Framework

The Sustainable Evaluation Framework is a set of criteria for capital project development that the Port adopted in 2020 to assist in achieving its sustainability goals, including the goals of reducing GHG emissions and air pollution. Capital projects, future infrastructure investments, and operational decisions proposed in this Plan will undergo the Sustainable Evaluation Framework review process. The project design and delivery that factors in environmental outcomes, climate resilience, lifecycle emissions and costs, equity, improved community health, and positioning the Port as a leader.

²⁴ Duwamish River Cleanup Coalition, [Cumulative Health Impacts Analysis \(CHIA\)](#).

Equity Index

The Port’s Office of Equity, Diversity, and Inclusion is developing an equity index to map environmental pollution burdens on socially vulnerable communities by census tract. This tool— together with the Washington Environmental Health Disparities Map—will ensure an equity approach to prioritize emission reduction actions in areas that experience higher exposure to environmental hazards and environmental health disparities, including the Duwamish Valley.



Cost estimates and cost-benefit analysis

Sample view of Port of Seattle Environmental Equity Map, displaying environmental health and social indicators ranked from least burdened (lighter blue) to most burdened (dark blue).

The strategies identified in this Plan outline the high-level actions, investments, and recommendations the Port must evaluate to achieve its vision. Focused resources will be needed to implement the Plan, including consistent annual funding and capital planning. Implementation will require holistic evaluation of benefits and costs. Per the Port’s Sustainable Evaluation Framework policy, cost estimates and cost-benefit analyses will be developed each year for upcoming projects and actions that meet certain thresholds – typically projects with high cost, high sustainability potential, or both. Other cost-related criteria such as simple payback, lifecycle cost, cost per MT CO₂, or total cost of ownership may also be required to evaluate and prioritize strategies and actions.



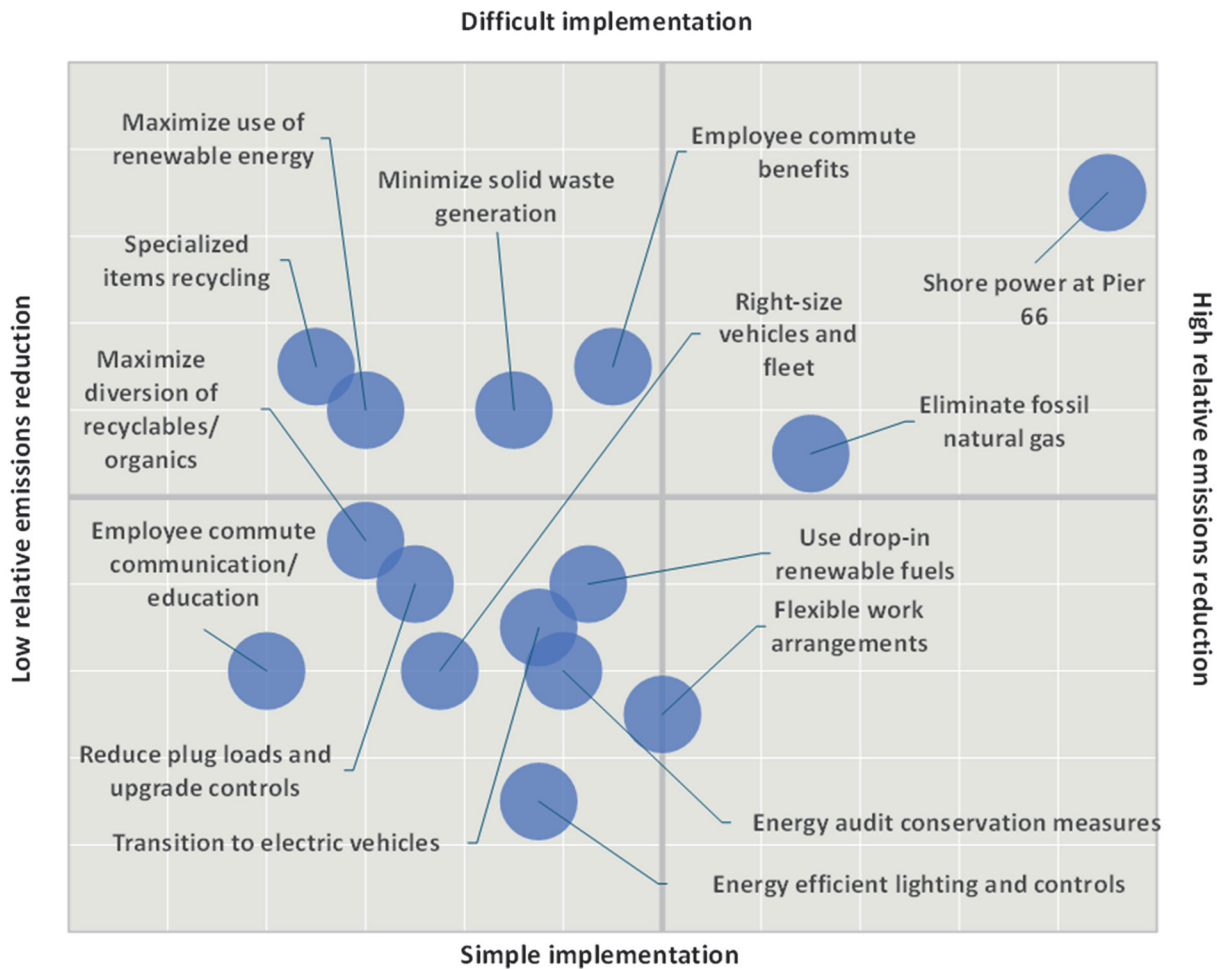
Table 4. 5-Year Implementation Cost Estimates. The following table summarizes cost estimates for select projects to implement Plan strategies and actions within the first five years. The capital project cost estimates are projects budgeted in the Port's five-year Capital Improvement Plan and represent planning level estimates. The costs are estimated over five years and do not represent the total cost of investment needed to achieve all of the strategies and actions identified. The estimates do not include the full cost of staff time or external costs to industry or others, and do not reflect cost savings or cost recovery opportunities from the investments (e.g., saving on energy or fuel costs) or grant funding.

Project	Plan Strategy	Cost Estimate 2021-2025
Capital Projects (approved and prospective)		
Shore power at Pier 66 Cruise Terminal by 2023 <i>Implementation cost is net after grant funding</i>	OGV1: By 2030, install shore power at all major Port of Seattle cruise berths	\$14,100,000
Install new shore power capacity for tugs at Harbor Island Marina's "E" Dock	HV1: By 2030, sufficient infrastructure is in place to enable adoption of zero-emission harbor vessels	\$485,000
Upgrade shore power and electrical capacity for fishing vessels at Terminal 91	HV1: By 2030, sufficient infrastructure is in place to enable adoption of zero-emission harbor vessels	\$1,500,000
HVAC upgrades Pier 66, World Trade Center West	BC1: Eliminate fossil natural gas	\$4,600,000
Install LED lighting in all waterfront properties	BC3: Install energy efficient lighting	\$3,700,000
Purchase energy management software for waterfront properties	BC6: Streamline and advance energy data management	\$700,000
Install electric vehicle charging stations at waterfront locations	FV2: Deploy electric vehicle charging across Port waterfront properties	\$850,000
5-year Fleet Replacement for Maritime, Economic Development Division, and Pier 69	FV4: Right-size vehicles and fleet	\$9,600,000
Near-term implementation of the Seattle Waterfront Clean Energy Strategy <i>Estimated capital costs; investments could include pilot projects, studies, or infrastructure upgrades. Implementation costs may vary significantly and may also include grant funding support</i>	XS1: Seattle Waterfront Clean Energy Strategy	≥\$500,000

Project	Plan Strategy	Cost Estimate 2021-2025
Capital Projects Subtotal		≥\$36,035,000
Programmatic Projects		
Completion of the Seattle Waterfront Clean Energy Strategy	XS1: Seattle Waterfront Clean Energy Strategy	\$200,000
National Renewable Energy Lab study at Terminal 91	BC5: Maximize use of renewable energy	\$75,000
Sustainable Evaluation Framework	Cross sector	\$150,000
Sustainable Maritime Fuels Program	OGV2: Support domestic and international efforts to phase out emissions from ocean-going vessels	\$250,000
Domestic and international maritime environmental policy engagement	OGV2: Support domestic and international efforts to phase out emissions from vessels	\$150,000
Non-capital outside services <i>Programmatic projects may include an inventory of maritime leases and development of green lease terms, building energy audits, cruise emissions research, completing the Puget Sound Maritime Air Emissions Inventory, and community and industry engagement.</i>	Cross-Sector	\$1,900,000
Programmatic Subtotal		\$2,725,000
TOTAL		≥\$38,760,000

Cost-benefit will be one of the criteria to prioritize and recommend strategies for implementation. However, the magnitude of GHG reduction, partnership potential, implementation difficulty, co-benefits, equitable distribution on benefits, and technology development will also be considered. For example, employee communication and education can be relatively low cost and easy to implement, but the potential for GHG reduction from education is limited. In contrast, eliminating use of fossil natural gas is relatively expensive and difficult to implement since it requires replacing multiple HVAC systems, but it has the greatest potential to reduce GHG emissions from the Port’s building and campus energy sector.

Figure 26. Estimated GHG reductions and implementation difficulty for select strategies



The strategies in the Plan are distributed according to relative emission reduction and implementation difficulty. Implementation difficulty incorporates cost, technology maturity, and the Port’s control over the emissions and implementation of the strategy. Methodology is discussed in [Appendix C](#), and implementation and reduction objectives are discussed in [Appendix A](#).

Continuous Improvement of Emissions Data

The Plan relies on emissions inventory data to assess emission trends, progress toward the Port’s GHG reduction targets, and estimate the impacts of implementing various emission reduction strategies. As more information becomes known about emission sources, the Port may revise inventory results for the baseline, current, or future years to fill data gaps in past inventories and provide a clearer picture of emission trends and target levels needed to meet its 2030 and 2050 goals. Emissions forecasts will be reanalyzed to include the impacts of the COVID-19 pandemic once more information is available. Emission inventories may also be expanded to include new sources where data was not previously available, such as trucks and buses not previously inventoried, and a more accurate assignment of emissions from building energy used by tenants.

New information on activities that result in emissions may also be collected. For example, on-going engagement may yield community-based knowledge and data sources such as air monitoring studies, which can inform Plan implementation.

Lifecycle emissions, which have not been accounted for in emissions inventories to date, will be evaluated when implementing this Plan. In alignment with the 2020 Strategy, the Port recognizes the importance of evaluating lifecycle to ensure that the full emissions impact of alternative fuel and energy options are considered and reduced.

Accountability Framework

Performance metrics

The Plan includes a set of performance metrics that will be used to measure success and annual progress in meeting targets and objectives. The metrics for each sector are listed in [Appendix A](#). Additional metrics may be identified through ongoing engagement with near-port communities to help track and measure progress.

Annual progress reporting

The Port will provide a public report-out annually to highlight progress relative to the metrics and targets, implementation actions, and achievements over the past year, and provide a preview of the year to come. To the extent practicable, progress reporting will be coordinated with the NWSA to provide a comprehensive overview of emission reduction actions in the Seattle harbor. In addition, the Port will collaborate with the NWSA, Port of Tacoma, and Vancouver Fraser Port Authority to produce an annual progress report on the overarching Northwest Ports Clean Air Strategy. This joint report will outline progress toward the shared vision, objectives, and actions outlined in the 2020 Strategy.

Adaptive management

The Port will take an adaptive management approach to monitoring, reporting, and reviewing the Plan, which is consistent with the 2020 Strategy framework. As advancements in technology, policy updates, and funding opportunities occur, the Port will change course or advance timelines and actions as needed. The adaptive approach also applies to the performance metrics set in this Plan, which will be reviewed and updated throughout implementation to ensure they remain relevant.

The Port will employ the adaptive management approach to monitor results and identify necessary updates on the following schedule:

Annually

- Conduct internal Maritime GHG inventory of Port Administration sources.
- Conduct an annual review of implementation efforts to review progress on each action, identify lessons learned, and update the actions and timeframes as needed.

Every five years

- Participate in the Puget Sound Maritime Air Emissions Inventory which covers Maritime Activity emissions of air pollutants and GHGs. The next Puget Sound Maritime Air Emissions Inventory

will cover the year 2021.

- Review the 2020 Strategy vision, objectives, and metrics in collaboration with participating ports.

As needed

- Update the GHG inventory baseline as new data is obtained, additional emissions sources become relevant, or when new inventory methodologies or emission factors become available.
- Update the Plan using new inventory data, progress to date, new targets, new strategies, and new actions with a longer planning horizon as technology, policy, or funding evolves, or at least every 5 years.

CONCLUSIONS

When the Port developed the Northwest Ports Clean Air Strategy with Port of Tacoma and Port of Vancouver 14 years ago, it was the first international collaborative effort of its kind in the port community. At the time, the Strategy's aim to put environmental performance above the competitive interests of the ports was a bold step. Yet, more than a decade later, the Strategy has achieved deep reductions in air pollution across the ports' shared airshed. Today, climate change is recognized to be the challenge of our lifetime. At this critical juncture, transformative changes on a global scale are urgently needed to prevent the most devastating effects of a warming planet, and ports have a key role to play in this transformation. The Port, along with the 2020 Strategy partners, is committed to phasing out emissions by 2050, setting a new level of ambition that recognizes the urgency of the climate crisis and the disproportionate impact of local air pollution on near-port communities.

This Plan charts a course for the Port to advance the vision of the 2020 Strategy. GHG emissions from **Port Maritime Administration** sectors – including building and campus energy, fleet vehicles and equipment, employee commutes, and solid waste – are not declining, despite noteworthy progress in some areas. Greatly intensified efforts over the coming decade are needed to reduce emissions. For **Maritime Activity** sectors—ocean-going vessels (cruise and grain ships), harbor vessels, cargo-handling equipment, trucks, and rail—GHG and DPM emissions have declined since 2005. However, additional action is needed to continue the course to zero emissions even as seaport-related trade is projected to grow in the coming years. The strategies and actions identified in the Plan can meet the Port's GHG reduction targets and keep on track to phase out emissions by 2050.

We cannot succeed in our vision alone. The Port has limited influence over the sectors that contribute the most emissions, and zero-emission pathways for some sectors are yet to be determined. Successful implementation will require significant collaboration across the port network. It will require the development and demonstration of new technologies and fuels for maritime applications; investment from ports, industry, government, and external funders; and regulations and policy incentives to foster new markets and drive the transition to zero-emission operations. As we embark on this course to 2050, the Port looks forward to working with other ports, industry, communities, governments, non-profits, and other partners to eliminate maritime-related emissions, create a sustainable, vibrant, and equitable maritime industry in Seattle, and become the greenest Port in North America.