PORT CLEVELAND

Cleveland Harbor Electrification Initiative

Clean Ports Program: Zero-Emission Technology Deployment Competition

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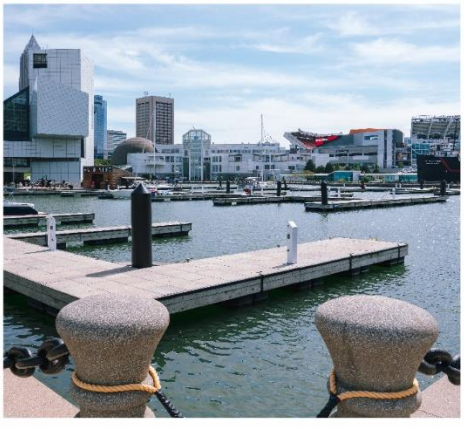

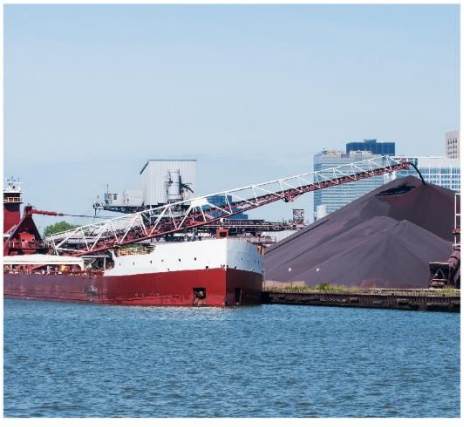

May 28, 2024

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Project Title	Cleveland Harbor Electrification Initiative
Applicant Information	**Applicant Name/Organization:** Cleveland-Cuyahoga County Port Authority **Address (Street, City, State, Zip):** 1100 W. 9th Street, Suite 300, Cleveland, OH 44113 **Contact Name, Title/Role, Phone Number, and Email Address:** Carly Beck, Senior Manager of Planning, Environment, & Information Systems (419) 386-6095 carly.beck@portofcleveland.com
Type of Eligible Applicant	X Port authority
Budget Summary	**EPA Funding Requested:** $94,261,128 **Applicant Costs:** $10,473,459 **Total Project Cost:** $104,734,587
Project Location(s)	**Name of Port served:** Port of Cleveland **Name of Port Authority, if applicable:** Cleveland-Cuyahoga County Port Authority **County, City, State:** Cuyahoga, Cleveland, Ohio **Percent of time/activity in each county:** 100%
Project Period	Project Start Date: January 1, 2025 — Project End Date: September 30, 2027 Project period of performance is 3 years.
Short Project Description	The Project will implement the next phase of the *Port of Cleveland Electrification and Net Zero Emissions Master Plan*. The Port of Cleveland (the Port) is currently in the process of developing an electrification hub at the annex building to Warehouse A through previously secured federal grant funding. This next phase will expand upon available charging infrastructure and will replace machinery, boats, and vehicles with electrified versions to reduce the Port's greenhouse gas emissions to eventually have a zero-emission (ZE) port. **Please indicate which of the following ZE port equipment and infrastructure types are included in the project:** X Cargo handling equipment & other nonroad X Vessels X Electric vehicle supply equipment X Vessel shore power infrastructure X Solar or wind power generation X Battery energy storage system
Other Potential Federal Funding Sources	N/A
Use of Logistics Software	Does the applicant use LOGINK or any other prohibited logistics platform as described in Section III.D. of the NOFO? __ Yes X No
Scalability	The Project is scalable.
Minimum Amount of Funding Needed	$22,453,083 (90% funding of the costs of Warehouse A solar and BESS microgrid, charging backbone, six forklifts, and one reach stacker)

Workplan

Section 1. Project Summary and Approach

a. Overall Project and Proposed Impact

Project Summary

The Port of Cleveland (the Port) requests funding under the Clean Ports program to deploy zero-emission (ZE) equipment and renewable energy that will improve air quality for Cleveland communities, reduce greenhouse gas (GHG) emissions, and build a foundation for the Port to rapidly decarbonize in the coming years, while achieving significant cost time savings by leveraging the Port's extensive work to prepare its facilities for emission-free infrastructure. The proposed Project consists of the following:

- Electric forklifts, reach stackers, and associated charging equipment
- Electric mobile harbor crane
- Electric tugboats and associated charging equipment
- Shore power
- Warehouse A Rooftop Solar and Microgrid —solar power and battery energy storage

By incorporating partners and implementing innovative ZE equipment through many different areas of port operations, the Port of Cleveland will serve as a catalyst for transformational change for local freight operations, benefitting communities both adjacent to the Port and throughout the region.

Project Background

This effort leverages the Port's current preparation of its facilities for emission-free infrastructure, chief of which is the Port's "electrification hub," a medium-voltage central connection point for all energy entering and leaving the Port's premises. The hub will provide the Port with reliable and modern connections for shore power, vehicle and equipment charging, and renewable energy. The hub also includes site work that will provide direct cost savings to the Clean Ports project, including conduit duct banks in support of proposed shore power and mobile harbor crane (MHC) infrastructure and a 6.6kV switchgear connecting to the proposed shore power installation. The hub is funded by FY22 Port Infrastructure Development Program (PIDP) and Ohio Maritime Assistance Program (MAP) funds and is currently undergoing detailed design to finish construction by 2026.

The Port has also completed extensive planning that will improve project efficiency and effectiveness. The *Port of Cleveland Electrification and Net Zero Emissions Master Plan* (Master Plan), published in November 2023, will guide the Port's implementation of Clean Ports program elements and includes the following:

- Strategies and precise planning for electrification of the Port's entire cargo handling, support vessel, yard tractor, and light-duty vehicle fleet, as well as switching locomotives and ship cold ironing.
- Planning studies to speed deployments for projects contained in this proposal, such as a glare study for the solar installation.
- Grid power estimates that have been used in coordination with Cleveland Public Power (CPP), the local electrical utility, to establish local grid capacity.

Project Elements

Electric Forklifts and Reach Stackers

The Port seeks Clean Ports funding to purchase two electric reach stackers and for its subaward partner and primary terminal operator, Logistec USA Inc., to purchase 10 electric forklifts. In 2022, the Port used forklifts and reach stackers for more than 14,000 hours; their diesel emissions were responsible for more than half of annual Port nonroad CO_2 emissions. From its current fleet, the Port and Logistec plan to scrap one diesel reach stacker and six diesel forklifts, all currently operational and meeting Clean Ports scrappage criteria.

Currently available models that meet Port operational needs include three electric forklift models (ZH360L, ZH550M and ZH650L) and one reach stacker model (ZRS9972) from Taylor Machine Works, Inc., located in Louisville, Mississippi. Each model meets Clean Ports replacement criteria and is compliant with Build America, Buy America (BABA). No challenges are anticipated with sourcing forklifts and reach stackers domestically.

Forklifts and reach stackers were responsible for more than half of CO_2 emissions from the Port's nonroad vehicle fleet in 2022.

Deployment History: Electric forklifts and reach stackers are proven technologies at ports. Electric forklifts have been deployed at several California ports, including West Sacramento, Stockton, Long Beach and Los Angeles. Electric reach stackers are in use at ports in Long Beach and Los Angeles in California and additional ports in the Netherlands and Germany.

Electric Vehicle Charging Equipment

To support the deployment of the electric forklifts and reach stackers, the Port seeks funding for the acquisition of seven 180kW direct-current (DC) fast chargers. Five chargers will provide power to 10 dispenser pedestals for forklift chargers; two chargers will provide power to two dispenser pedals for reach stacker charging. The Electrification Master Plan includes significant design details for the installation of charging ports on the east side of Warehouse A. Chargers will be connected to the electrification hub's 12kV substation facility currently under design.

Based on anticipated charging and equipment duty cycles, the chargers will be able to support future electric equipment deployments; the Warehouse A design is extensible with room to grow for additional charging equipment installations.

The Port has identified 180kW models from Heliox (now wholly owned by Siemens) as suitable models based on price, compatibility, reliability, and high uptime and BABA compliance requirements. These charging stations have been deployed in the U.S. over the last 5 years for a variety of federally funded electric truck, bus, and equipment deployments, including for transit buses in Atlanta, Georgia, and Knoxville, Tennessee, and port drayage trucks in Southern California.

Electric Mobile Harbor Crane (MHC)

The Port seeks funding for its subaward partner, Logistec, to purchase one electric MHC to supplement the Port's two existing units. Compared to a new diesel MHC, the electric MHC will provide substantial local pollution benefits, avoiding 710 tons of CO_2, 30 pounds of NO_x, and 144 pounds of $PM_{2.5}$ local emissions annually.

Without permanently mounted or rail-mounted cranes, the Port makes extensive use of MHCs for its daily operations. The current MHCs at the Port are 84-ton rated, and the new proposed MHC is 150-ton rated, enabling the Port to grow its heavy-lift and bulk cargo business, tapping into a critical market in the Great Lakes that is anticipated to grow substantially in the coming decades.

As no electric MHCs are currently available from U.S. suppliers, the Port identified suitable electric cranes from international suppliers, including the Kone Gottwald ESP.8 electric MHC from Kone, Germany. Kone has confirmed the ESP.8 electric MHC can be purchased for final manufacture in the U.S., qualifying it for the EPA's published BABA waiver.

The Port's existing underground electrical conduits, installed at four berths in 2022, as well as the electrification hub's upcoming 12kV electrical equipment, will allow efficient MHC installation and connection to grid power. MHCs will connect to industry-standard, medium-voltage-rated IEEE 80005 outlets in new underground vaults. Crane connection outlets and electrical equipment will be located with the power infrastructure and provide flexibility to a variety of current market-available MHCs.

Deployment History: Kone electric MHCs have been deployed at multiple ports around the world, including the Port of San Diego in California and Hartel Terminal in Maasvlakte, the Netherlands. In April 2024, the Port of Nassau in the Bahamas ordered a new Kone MHC. Logistec operates and maintains 11 Kone MHCs, one of which is equipped with a cable reel for electric operations when infrastructure is available.

Electric Tugboats and Chargers

The Port seeks funding for the purchase of two electric tugboats and associated charging equipment to replace its Tier 3 tugboats. The Port's tugboats are owned and operated by the Great Lakes Towing Company (GLT), a subaward partner in this application. The Port's four tugboats are a significant source of Port emissions, releasing more than 700 tons of GHGs, 6 tons of NO_x, and 0.1 ton of $PM_{2.5}$ in 2022.

These Tier 3 tugboats will be relocated to the Port of Milwaukee and to Burns Harbor at the Port of Indiana to replace decades-old legacy tugboats that emit pollution far beyond currently allowed standards. Though this plan will not qualify under Clean Ports scrappage requirements, it will deliver pollution reduction benefits and a safer, more modern fleet for the Great Lakes community.

Electric tugs will be procured meeting all EPA competitive procurement and BABA compliance requirements (potentially including domestic final assembly to satisfy the proposed Clean Ports BABA waiver). The Port and GLT have identified the Damen Stan Tug 1907 with BE modifications as a likely design. Corvus Energy currently sells suitable energy storage systems for marine applications. Great Lakes Shipyard, a sister company of GLT that builds ships using Cleveland union workers and has delivered hybrid-electric tugboats since 2019, has confirmed its ability to build the identified electric tugs.

GLT will install two megawatt charging standard (MCS) chargers for fast charging that meets operational needs, with a cable reel that can be easily handled by a single worker. MCS is well-established and supported by the Department of Energy. A medium voltage DC charger will be connected to both MCS reels to supply the necessary 1.5MW charge rate to each tugboat. Available chargers include the BABA-compliant Hitachi Energy Grid E-Motion system, with a North American deployment history including a 2023 installation for charging Penske drayage truck fleets in southern California. It is anticipated that some non-BABA ancillary tug charging equipment will be funded under the *de minimis* waiver amount.

The tug charging installation will also include a battery energy storage system (BESS) that will allow the tugs to overcome grid capacity constraints at the GLT site. The Port has identified the BABA-compliant Tesla Megapack 2MW/7.8MWh BESS as a potential option.

Deployment History: Internationally, all-electric tugboats have been deployed for many years. Damen delivered all-electric tugboat fleets to the Port of Aukland in 2022 and to the Port of Antwerp-Bruges in April 2024. Although the use of electric tugboats in U.S. ports is relatively new, deployments are underway. The nation's first all-electric tugs were deployed at the Port of San Diego in March 2024.

Shore Power

The Port seeks funding to install shore power at a cargo berth at Dock 24E. This project would be the first installation of cargo ship shore power in the Great Lakes. It will be made possible by extensive planning and active coordination with international shipping companies to ensure immediate usage by compatible vessels, while unlocking a virtuous cycle of shore-power ready ships and infrastructure over coming years.

Figure 1. The Wagenborg Fuldaborg at Dock 24E

Ship diesel auxiliary engine emissions while at berth are the largest source of local air pollution and GHGs at the Port, equaling 83% of NO_x and 60% of CO_2 emissions, and the Port has prioritized shore power as a critical decarbonization strategy. The installation will be put to immediate use supplying European cargo ships from Wagenborg (Figure 1) to achieve emissions reduction in the next 5 years. In 2022, Wagenborg shipping called to the Port 16 times with 8 unique vessels. The 16 calls totaled approximately 680 hours, equivalent to 282,200 kWh of energy. Based on analysis using EPA's shore power calculator, transitioning these annual Port calls will eliminate 3.2 tons of local NO_x and 0.05 tons of local $PM_{2.5}$, and a net reduction of annual GHG emissions of 64 tons. A letter of support from Wagenborg is included with this application.

The shore power installation will include a 12kV to 6.6kV step-down transformer, connections to the dock through already-built conduit, addition of 6.6kV-ready equipment at Dock 24E, and a semi-permanent 400V transformer and associated equipment at Dock 24E. Although 6.6kV shore power connections have become a *de facto* standard of the marine shipping industry, many existing ships, including Wagenborg ships, are only compatible with 400V connections. The Port has identified movable, container-based 400V equipment that offer shore power flexibility for near-term operations, and the 6.6kV equipment installed with Clean Ports funding will future-proof the Port's ability to provide shore power for decades to come.

Additionally, a single mobile cable management system (MCMS) will be procured to support shore power operations for the vessel fleet from Wagenborg shipping lines. The MCMS will be a mobile self-propelled unit capable of 400V power, as well as 6.6kV cabling, to support future medium-voltage-capable vessels.

Warehouse A Solar and BESS Microgrid

The Project will include installation of rooftop solar and BESS that will provide emission-free energy for vehicle charging and shore power. This installation will also mitigate high electrical rates from CPP and provide grid resiliency from the downtown Cleveland grid. As the Port's operating season—typically late April to early December—aligns with Cleveland's peak solar generation windows, the system will allow Port activities to maximize utilization of the solar system.

The Master Plan study found that, for solar, the Warehouse A roof offered the best basis for a large continuous solar array. Conceptual Helioscope solar models were generated for Warehouse A. The system will use FirstSolar BABA-compliant solar modules as well as a flush-mounted racking system. The full site has an estimated total capacity of 2.15MW and would produce an estimated 4.8GWh each year. Provisions for seabird deterrent systems and cleaning systems are included within the budget, ensuring high uptime and efficiency.

The rooftop solar installation will be supported by the deployment of a stationary BESS, which will enable solar energy to be used for the Port's ZE cargo handling equipment's nighttime charging needs as well as shore power hoteling needs. The Port has identified the BABA-compliant Tesla Megapack 2MW/7.8MWh BESS (the same model identified for tug charging support) as a potential option.

b. Partnerships and Collaboration

Collaborating Entities

As a landlord port, the Port leases its wharves. Logistec USA, Inc. serves as the primary terminal operator and operates all equipment for daily operations. Logistec is a leading terminal operator across North America, operating in 60 ports and 90 terminals with a proven safety record. Logistec has also been an involved participant in Green Marine, a voluntary environmental certification program, since 2007.

The Port also relies on contracted tugboat services to facilitate cargo movement, in addition to servicing vessels on the Cuyahoga River. Great Lakes Towing, part of the Great Lakes Group, is the sole provider of tugboats to the Port. Incorporated in 1899, The Great Lakes Group is a full-service marine transportation organization made up of a "group" of diversified marine-related companies operating on the Great Lakes. The companies provide transportation, logistics, new construction, fabrication, repair, and line-handling services across the Great Lakes. The Great Lakes Group consists of the following companies:

- Admiral Towing & Barge Company
- Great Lakes Shipyard (Shipyard)
- Tugz International LLC
- Soo Line Handling Services, Inc
- GLT
- Wind Logistics Inc

GLT owns, operates, and charters the largest and most experienced U.S.-flag tugboat fleet for service in over 40 U.S. ports, including the Port of Cleveland. The Shipyard is on the Cuyahoga River about 1 mile downstream from the Port and is a full-service shipyard for new vessel and barge construction, fabrication, maintenance, and repairs in a state-of-the-art facility that includes a 900-ton mobile Travelift. The Shipyard has unique expertise in developing hybrid electric tugboats on the Great Lakes, with the first hybrid tugboat, the *Michigan*, delivered in 2019.

Subawards

To enhance Project effectiveness and efficiency, the Port will execute subaward agreements, consistent with this grant application and EPA's Subaward Policy, with both Logistec and GLT. Draft subaward agreements have been reviewed by all parties, and letters of commitment are provided as attachments.

Both Logistec and GLT have prior experience with the receipt of federal grant subawards, successfully meeting procurement requirements. GLT was a subawardee to the Port for the FY17 Diesel Emissions Reduction Act (DERA) grant, with grant funding successfully closed out. Logistec was a subawardee to the Port for the FY21 DERA grant, and project activities were completed under budget and ahead of schedule.

Logistec and GLT will retain ownership of all newly purchased equipment and infrastructure and will be fully responsible for all future operational and maintenance needs. All purchases will remain in Cleveland to serve the Port in accordance with NOFO requirements.

Partnership with Cleveland Public Power

CPP currently provides all power needs to the Port, with nearly one quarter of power being generated from renewable sources. As part of the development of the Master Plan and securement of FY22 PIDP funding, the Port entered into ongoing coordination with CPP for the assessment of existing infrastructure, procurement, and distribution of adequate electrical power, as well as the development of charging infrastructure. This involved routine coordination with CPP on Project feasibility to determine charging and upgrade needs, the timeframe for necessary upgrades, as well as costs and rates for future service. These are all detailed in the attached appendices:

- Signed Utility Partnership Template
- Jacobs, Port of Cleveland, and CPP Power Engagement Summary
- Port of Cleveland Electrification and Cold Ironing Energy Model Assumptions

As the Project proposes the implementation of several subcomponents of the Master Plan, the Project scope of work ensures charging and upgrade needs will be met before the acquisition of electric machinery and EVs. Additionally, solar installation will offset some of the increased demand for power.

c. Coordination with Complementary Initiatives

In conjunction with the development of the Master Plan, the Port has invested over $93.8M in infrastructure since 2015, with 75%+ of the cost covered by state and federal grants. Grant funds have supported various projects aimed at modernization, sustainability, and infrastructure development, which align with the broader program goals of reducing Port emissions and transitioning to ZE operations. Several recent coordination efforts are as follows:

- The Port has secured $32M+ in federal and state grants for the rehabilitation and modernization of a key warehouse and electrical infrastructure upgrade at its General Cargo Terminal. This project included the development of the Master Plan, which developed the roadmap and project planning for the elements of this application. The grants for this project include $27.2M from the U.S. Department of Transportation (DOT) Maritime Administration (MARAD)'s PIDP and $4.9M from the Ohio DOT's MAP.
- In 2021, the Port completed improvements at its main gate to improve the security clearance process and truck turn time via U.S. DOT FHWA Earmark OH302.
- In collaboration with the Port, Omnitrax, the provider of switching rail services at the terminal, will deploy a fully Battery Electric (BE) locomotive later this year using Ohio EPA Diesel Mitigation Trust Fund funding. The new locomotive will reduce fuel consumption by 50% and PM pollution by 77%.
- In 2020, the Port received a grant from the U.S. DOT MARAD to rehabilitate and improve two cargo docks at the Port on Lake Erie. This project helped improve the efficiency of port operations.
- The Port has received two DERA grants to date, one in 2021 to replace tugboats and one in 2017 to replace a loader at the Port's Cleveland Bulk Terminal. These grants amount to just under $1M.

- In addition to grants that have been secured, the Port submitted a PIDP grant this year for investments to improve the efficiency and capacity of container movements. This application was designed to strongly complement proposed Clean Ports equipment upgrades.

Combined, these initiatives help underscore the Port's commitment to reducing emissions and transitioning to ZE operations. Additionally, the Project complements local, state, and federal ZE initiatives:

- At the federal level, within the National Zero-Emission Freight Corridor Strategy, the Port is listed as a Phase 3 freight hub. Project funding will support a broader ecosystem of ZE freight activity, through funding of ZE vehicles, tugboats, and charging infrastructure.
- At the regional level, the Project supports the Great Lakes Green Shipping Corridor Network, which aims to establish a network of green shipping corridors through transition to ZE or near ZE vessels.
- At the state level, the Project will help advance ODOT'S Long-Range Transportation Plan, which discusses climate variability and methods the state can deploy to achieve better air emissions.
- Locally, the Project aligns with several Northeast Ohio Areawide Coordinating Agency (NOACA) strategic plans, including eNEO2050, which focuses on maintaining transportation assets, economic development, sustainable technologies, encouraging employment, and environmental protection.

d. Project Risk Mitigation

Technical Risk Mitigation Measures

- Equipment Malfunctions: The Port is only considering the use of proven technology, such as market-available EVs and EV charging systems and no new or "first-of-its-kind" technologies.
- Power Availability during Grid Outages: The Port will install solar and battery storage systems providing EVs with stored, onsite power during grid outages. Also, the Port's utility provider, CPP, will provide a new grid connection with two redundant medium voltage feeders, improving resiliency.
- Electrical Equipment Risks: The electrification hub will be designed to supply chargers with proper electric power, voltage, and current. The new electrical supply is designed to limit the chances that chargers and vehicles are out of service due to electrical supply problems or damaged equipment.
- Equipment Incompatibility: The Port will seek, through a competitive procurement process, a single supplier for both vehicles and chargers that have been fully tested for compatibility to ensure vehicles are compatible with chargers.

Financial Risk Mitigation Measures

- Matching Commitments: The Port has received funding commitment letters from Project partners and drafted and shared subaward agreements for their understanding. The Port has an extensive relationship with Project partners that includes a successful history of similar (EPA) pass-through grants.
- The Port is leveraging private partner funding for a majority of costs and while the Port has sufficient cash reserve to provide its local match, plans for state funding to provide the remaining 10% match for Port allocated budgets, similar to PIDP grant financing arrangements.
- Pricing Variability: Market changes can affect prices, and the Port's cost estimates are based, to the extent practicable, on market research and vendor quotes. Additionally, the Port will acquire equipment through a competitive process to reduce price exposure to any individual suppliers.

Security Risk Mitigation Measures

- EV charging and surrounding systems including the vehicle and power grid are subject to cybersecurity threats. These threats could result in loss of customer or financial data, or compromised control of the EVSE physical system. The Port takes these risks seriously and mitigation strategies are in place.
- EV Charging Security: The Port plans to implement common security EV charger practices modeled after Department of Defense facility installations where the information is stored on a dedicated and secured server with end-to-end encryption on a private IP. EV chargers will be managed via onsite local servers and hardwired, and the Port will limit software access to only select authorized users.

- U.S. Coast Guard (USCG) Assessments: The Port's security plan is reviewed annually thorough USCG surprise inspections, scheduled inspections, or audits. In 2022, the Port voluntarily underwent a Port-wide risk and vulnerability assessment by the USCG Cyber Protection Team (1790 CPT) and has been implementing recommended cybersecurity measures, such as removal of unsupported operating systems or applications and multi-factor authentication, amongst others.
- Modern Security Systems: The Port modernized its main entrance gate in 2021 to include a new access control system, along with new surveillance infrastructure and equipment.

Organizational Risk Mitigation Measures

The Port does not believe there are notable organizational risks that could cause delay or other implementation issues, as the Port and its partners have a committed and experienced workforce with extensive history implementing electrification projects and executing grants.

Execution Risk Mitigation Measures

- Power Availability: Since 2022, the Port has been in close contact with CPP to ensure sufficient power availability. Through the Port's Master Planning process, the Port estimated power needs for a full electrification plan, including Clean Ports-proposed activities. CPP found that the 2 MW required for near- to medium-term electrification can be accomplished using the site's current 12kV feeding circuits, 141M and 140M.
- Contractor and Consultant Availability: The Port has long-standing relationships with local contractors and suppliers and has conducted outreach to ensure their availability to support.
- Vehicle Availability: The Port has interacted and engaged with suppliers of vehicles, cranes, and vessels, in addition to the necessary supporting EV charger hardware equipment and has received assurances that these products will be available for delivery during the expected project timeline.
- Environmental Compliance and Permitting: Environmental permitting is expected to be limited and efforts to identify and acquire any necessary permits will occur early in the Project timeline. The Port anticipates no impacts to Lake Erie or the adjacent Federal Navigation Channel, no impacts to Section 106 properties or endangered species, and no real estate will need to be acquired. Solar power installation permitting needs have been reviewed, and a glare study for the Warehouse A solar PV array found that solar panel glare impacts would be similar to pre-existing glare from Lake Erie.
- Local Government Support: The Port regularly coordinates with local government agencies and other organizations, including the City of Cleveland, Cuyahoga County, and the Greater Cleveland Partnership (the area of chamber of commerce) via Greater Cleveland Climate Action Network (GC-CAN) working group meetings. Letters of support from these partners are included as attachments.

e. Applicant Fleet and Infrastructure Description

An Excel file has been provided in the attachments detailing the proposed fleet and infrastructure.

Section 2. Environmental Results—Outcomes, Outputs, and Performance Measures

a. Expected Project Outputs and Outcomes

Expected project outputs and outcomes are shown in Table 1, including equipment deployments, emission reduction estimates, and community benefits.[1]

[1] Emissions estimates for the Project were derived using EPA MOVES factors for vehicles, the EPA's Shore Power Emissions Calculator for shore power, and EPA eGRID emission factors for solar power. Emissions estimates account for scrapped vehicles; for fleet additions without scrappage, avoided emissions were calculated with the assumption that new diesel vehicles of equivalent type and rated horsepower would have been purchased instead.

Table 1. Expected Project Outputs and Outcomes

Activities	Outputs	Outcomes
• Deploying ZE cargo handling equipment and associated charging equipment • Equipment scrappage	• Ten new forklifts • Two new reach stackers • Six scrapped forklifts • Seven 180kW vehicle chargers (12 dispensers) installed	• Annual local emissions avoided: 2,210 pounds of NO_X, 124 pounds of PM_{25}, 241 tons of CO_2 • Reduction in annual diesel fuel consumption: 23,721 gallons
• Deploying ZE harbor vessels and associated charging equipment • Scrapping comparable vessels at secondary port	• Two new electric tugboats • Two diesel tugboats shipped to replace high-polluting Tier 0 tugboats at Port of Milwaukee and Port of Indiana • Two MWDC harbor vessel charging systems installed	• Annual local emissions avoided: 6,110 pounds of NO_X, 100 pounds of PM_{25}, 351 tons of CO_2
• Deploying ZE mobile harbor cranes and power equipment	• One new BE MHC • Installation of crane charging/ powering equipment	• Annual local emissions avoided: 520 pounds of NO_X, 20 pounds of PM_{25}, 144 tons of CO2
• Installing shore power	• Shore power installation at one dock location • Infrastructure installation to enable expanded future shore power operations	• Annual local emissions avoided: 7,050 pounds of NO_X, 106 pounds of PM25, 220 tons of CO_2
• Installing solar plus storage renewable energy system	• Installation of one solar energy system (2.15MWDC capacity) • Installation of one BESS (7.8MWh capacity)	• Annual power grid emissions avoided: 1,470 pounds of NO_X, 166 pounds of PM25, 1,231 tons of CO_2
Community Outreach and Workforce Development		
• Holding board meetings • Distributing fact sheet and conducting associated public survey	• Local community members and stakeholders to provide public comment	• Public feedback possibly necessitating revised Project implementation methods
• Creating local jobs	• Hiring of local workers	• New short-term engineering and construction jobs • New long-term equipment and infrastructure maintenance jobs

b. Performance Measures and Plan

Table 2 details the Port's performance measurements and plan by anticipated output and outcome. The Port's reporting will take place via the EPA Clean Ports semiannual and final report. All Project activities will take place within Cuyahoga County (County).

Throughout the procurement and installation process, the Port will ensure proper systems are in place to track equipment deployment, usage, and environmental impact. Throughout the project, the Port will report on lessons learned and hurdles or success stories. The Port will be responsible for reporting on performance measures related to Port and subaward-partner project elements and will work with partners to ensure tracking systems are consistent for deployed equipment and infrastructure.

The Port has extensive experience with vehicle, fuel, and emissions tracking, as shown by recent reports published by the Port, including its Master Plan, Emissions Inventory, and Climate Action Plan (CAP).

Table 2. Performance Measurement Plan

Output or Outcome	Performance Measurement Plan
Vehicle or Vessel Deployment and Use	• Following the procurement process, the Port will include status updates in all semiannual reports for EPA describing whether vehicles are on track for timely delivery, with detailed descriptions of any delays and anticipated Project impacts. • Following vehicle deployment, the Port will track vehicle usage using an existing asset management system, including number of vehicles deployed, vehicle activity, and avoided emissions. The Port will compile vehicle emission impacts in its final report to EPA and will use charts and key performance indicators (KPIs) to illustrate vehicle usage and environmental impacts.
Vehicle Scrappage	• In anticipation of vehicle deployment, the Port will provide an update on scrappage plans to EPA in one of its semiannual reports. The update will include key details on a scrappage plan, including anticipated scrappage date, contracted company, scrappage process, and efforts to limit environmental impact from scrappage, such as ensuring that metals are recycled and components are properly disposed of.
Infrastructure Deployment and Use	• Following the procurement process, the Port will include status updates in all semiannual reports for EPA describing whether infrastructure deployment is on track, with detailed descriptions of any delays and anticipated project impacts. • Following the installation of infrastructure, the Port will track charging KPIs including but not limited to hourly usage, uptime, charged energy, and, if possible, emission impact. The Port will compile usage data in its final EPA report and will use charts and narratives to illustrate project impacts.
Shore Power Deployment	• Following the procurement process, the Port will include status updates in all semiannual reports for EPA describing whether shore power deployment is on track, with detailed descriptions of any delays and anticipated Project impacts. • Following shore power installation, the Port will track KPIs, including, but not limited to, usage by vessel, energy consumption and avoided emissions. The Port will compile shore power data in its final report to EPA and will use charts and narratives to illustrate impacts.
Emissions Impact	• In addition to tracking emission impact by technology (vehicles, vessels, and shore power), the Port will aggregate and track KPIs for total Project emissions impact, including $PM_{2.5}$, NO_x, and GHGs. In its semiannual reporting, the Port will document emissions tracking strategies as they develop. The Port will also report on avoided emissions, both over time and total, in its final report to EPA.
Community Engagement	• In its semiannual report, the Port will document KPIs and narratives related to community engagement efforts. KPIs will include the number of outreach efforts with community organizations, number and type of community outreach materials, and listserv emails sent. • In its final report to EPA, the Port will interview members of engaged community organizations to document feedback, lessons learned, and community impacts.
Workforce Development	• The Port will track KPIs on workforce development, including, but not limited to, training provided by hours and staff number, and licenses obtained by training topic. The Port will work with its Project partners to ensure that partner workforce development KPIs are included. The Port will report on workforce development efforts in its semiannual reports to EPA.

c. Timeline and Milestones

The Port is confident that it can complete all Project work and reporting within EPA's estimated 4-year period of performance as shown in Table 3. Note, the timeline includes the design and construction of the Port's electrification hub, which is not paid for with Clean Ports funds but is a prerequisite for the installation of proposed infrastructure; this work is estimated to be completion by the start of 2026.

Table 3. Project Timeline

	2024		2025				2026				2027				2028				2029	
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Award Notice	X																			
Grant Agreement Execution		X																		
EPA Reporting (Semiannual and Final)				S		S		S		S		S		S		S			F	

Competitive Procurement			A	B	C	D													
Electrification Hub Design/Construction*	Y	Y	Y	Y	Y	Y													
Planning and Design							X	X	X										
Infrastructure Installation										X	X	X	X	X					
Mobile Equipment Delivery														X	X	X	X		

*The electrification hub is a prerequisite project paid for with non-Clean Ports funding.

Legend
X - Clean Ports Project Work
Y - Relevant Non-Clean Ports Project Work
S - Semiannual EPA Report Delivery
F - Final EPA Report Delivery

Competitive Procurement Process
A - Draft/publish solicitations
B - Receive/evaluate offers
C - Negotiations
D - Award contracts

d. Scrappage

Vehicles to be scrapped by the Port and Logistec are listed in the supplemental spreadsheet and in Table 4. All scrapped equipment meets the non-road scrappage eligibility criteria, including 3 years estimated lifetime after scrappage, horsepower within 40% of the replacement, and more than 500 hours of operation for each of the last 2 years. All vehicles will be scrapped per EPA requirements, and EPA Form 5900-684 will be submitted as required.

Table 4. Equipment to be Scrapped

Current Vehicle or Equipment Manufacturer	Current Vehicle or Equipment Model	Current Vehicle or Equipment Model Year
Hyster	H280XL2	2001
Yale	GDP360	2007
Taylor	TE520M	2001
Hyster	H550HD	2012
Hyster	H550HD	2011
Taylor	TX550M	2012
Hyster	45-31 CH Series D222	2015

Section 3. Programmatic Capability and Past Performance

a. Past Performance and Reporting Requirements

Table 5 identifies five federal funding assistance agreements that the Port has performed within the last 3 years or is currently in the period of performance.

Table 5: Past Performance

	National Clean Diesel Funding Assistance Program	Port Infrastructure Development Program	Diesel Emissions Reduction Act	Great Lakes Restoration Initiative	Port Infrastructure Development Program
Project Title	Great Lakes Towing Fleet Upgrade	Dock 24 and 26 Master Modernization and Rehabilitation Project	Cleveland Bulk Terminal Loader Replacement	Green Bulkhead at Irishtown Bend	Electrification and Warehouse A Modernization
Fiscal Year	2017	2019	2021	2021	2022
Federal Funding Agency	EPA	MARAD	EPA	EPA	MARAD
CFDA	66.039	20.823	66.039	66.469	66.039
Assistance Agreement Number	00E02338	693JF71910010	00E03004	00E03067	693JF72344012
Funding Amount	$750,000	$11,000,000	$186,250	$1,700,000	$27,223,711
Agreement Description	The Port received funding to award a subgrant to GLT for the replacement of	The Port received funding to reconstruct and raise Docks 24 and 26, rehabilitate the Dock 24	The Port received funding to award a subaward to Logistec to	The Port received funding to install 1,000 linear feet of green bulkhead	The Port received funding to modernize Warehouse A,

	National Clean Diesel Funding Assistance Program	Port Infrastructure Development Program	Diesel Emissions Reduction Act	Great Lakes Restoration Initiative	Port Infrastructure Development Program
	four Tier 0 single-engine tugboats with two Tier 3 dual-engine tugboats.	rail spur, install a new stormwater treatment system, deploy a fiber optic wireless network, and reconstruct the road between the two docks.	replace one 1997 Caterpillar 990 Series II Wheel Loader (Pre-Control) with one new Caterpillar 990K Wheel Loader (Tier 4).	along the Cuyahoga River, along with 0.5 acre of wetland water quality ponds and approximately 1 acre of native plantings along the length of the bulkhead.	expand stormwater treatment infrastructure, construct a modernized maintenance and repowering facility, and install an electrification hub for future electrification efforts.
Status	Complete	Substantially Complete	Complete	In Progress	In Progress
Final Report Status	Submitted on 08/16/2023	N/A	Submitted on 7/12/2022	N/A	N/A
Progress Reports	Reported adequately and timely with quarterly and annual frequency to achieve expected outputs and outcomes. EPA provided a time extension because of COVID-19 pandemic hardships.	Currently reports adequately and timely. The Project has experienced schedule delays due to various issues such as subsurface change conditions, etc., that were communicated to MARAD.	Reported adequately and timely with quarterly frequency to achieve expected outputs and outcomes.	Currently reports adequately and timely to achieve expected outputs and outcomes.	Currently reports adequately and timely to achieve expected outputs and outcomes. Approved pre-award spending activities for planning and PE were completed successfully. First quarterly report has been submitted.

b. Staff Expertise

The Port's Capital Planning & Development and Accounting teams have extensive experience in planning, design, and construction projects and federal grant management and have successfully met all reporting requirements for federally funded grants received. Port staff have gained expertise in electric infrastructure and emissions reduction projects through the procurement of a BE switching locomotive, development of underground berth infrastructure for future vessel shore power, development of an updated emissions inventory and CAP in 2023, and development of their Master Plan in 2023. Port staff, with Project partners, have sufficient resources and the ability to obtain identified equipment. Port staff, Project partners, and consultants have demonstrated a capacity to obtain quotes and services from manufacturers through outreach, as was done to create the Project budget. The following Port staff will help deliver the Project and provide invaluable expertise:

Project Manager: Carly Beck

Carly Beck is the Senior Manager, Planning, Environment, & Information Systems at the Port and works on a variety of capital planning, grant management, environmental, and asset management efforts at the Port's General Cargo and Bulk Terminals. Carly is a Project Management Professional (PMP) and has a B.S. in Biology/ Environmental Science from the University of Toledo. She is the Vice Chair of the American Association of Port Authority's Environment Committee and a member of the Green Marine Great Lakes Advisory Committee, Cuyahoga River Area of Concern Advisory Committee, and the GC-CAN working group.

- Led 2023 emissions inventory, Master Plan, CAP, and 2021 Stormwater Management Master Plan
- Manages Green Marine reporting and continual improvement requirements
- Leads regulatory process for capital projects (NEPA)
- Manages environmental compliance of all Port operations
- Has written/led grant applications resulting in over $39M in funds for the Port

Engineering/Technical Lead: Matt Wenham, Professional Engineer (PE)

Matt is the Port's Chief of Engineering & Capital Development and is responsible for projects and programs involving the upgrade and improvement of the Port's facilities in a sustainable, quality, and cost-effective manner. Matt is a P.E. in multiple states and is credentialed as an Envision Sustainability Professional. Prior to joining the Port team, Matt led a national consulting practice of architects, planners, engineers, and construction managers and maintains a credential as an Envision Sustainability Professional. He has managed, designed, and reviewed projects involving more than a billion dollars of construction value. Matt is a graduate of Rensselaer Polytechnic Institute.

- Currently leading the FY22 PIDP Electrification & Warehouse A Modernization Project
- Leading loading analysis for proposed electric crane deployment

Maritime Lead: Dave Gutheil

Dave is the Port's Chief Commercial Officer. His responsibilities include strategic management of all aspects of the maritime functions, including business development and operations. He has over three decades of experience in transportation and logistics, including senior level operations and business development positions in trucking, intermodal, and third-party logistics. He sits on various maritime and logistics committees and boards focusing on marketing and business development in the cargo industry. He has a B.A. in Economics from Wittenberg University.

- Led the development of the Cleveland-Europe Express
- Led the 2015 CMAQ application resulting in acquisition of the Port's two current MHCs
- Oversees terminal operator agreements and tariffs

Financial Lead: Carl Naso

Carl has served as the Port's Chief Financial Officer since 2017. He is a Certified Public Accountant with over forty years of financial leadership experience including as Operations Controller for The Oglebay Norton Company and controller in the logistics, manufacturing, and mining industries with companies, such as Penske Logistics, Alcoa, and Aleris. Carl is a graduate of Kent State University.

- Serves as the financial lead for all grants at the Port
- Ensures compliant accounting processes

Section 4. Environmental Justice and Disadvantaged Communities

The County contains CEJST census tracts identified as disadvantaged and census block groups at or above the 90th percentile when compared with the nation as shown on Figure 2; nearly 500,000 people, or 39% of the population, live within disadvantaged census tracts in the County, and the community directly surrounding the Port is designated as disadvantaged by these same census tracts and block groups. Additionally, the County contains a nonattainment area for O_3 2015 Standard (8-hour: 0.070 ppm) (Figure 3). The Project is located within a county that meets the criterion that the entire county is located within a $PM_{2.5}$ maintenance area (Figure 5). The County is not located within severe or extreme nonattainment areas. The County contains 164 census tracts where the modeled ambient diesel PM concentration from the 2019 Air Toxics Screening Assessment is above the 80th percentile (0.38 µg/m^3 for 2019) for census tracts nationwide (Figure 4). The County is also in a maintenance area for the following standards:

- $PM_{2.5}$ 2006 Standard (Annual: 15 µg/m^3, 24-hour: 35 µg/m^3)
- $PM_{2.5}$ 2012 Standard (Annual: 12 µg/m^3, 24-hour: 35 µg/m^3)
- O_3 2008 Standard (8-hour: 0.075 ppm)

The County is designated as disadvantaged under these criteria and is identified on the EPA's Clean Ports Program Disadvantaged Community County List. Port location information is as follows:

- **Facility Name:** Port of Cleveland
- **City, State, Zip Code:** Cleveland, OH 44113
- **County:** Cuyahoga
- **Description of Project Activity:** The Project activity will consist of the acquisition of electric forklifts, electric reach stackers, an electric MHC, electric tugboats, a rooftop solar PV system for Warehouse A, and a stationary BESS coupled to the proposed rooftop PV solar systems. Additionally, EV charging infrastructure for cargo handling equipment, as well as shore power capability, will be provided to ensure equipment, vessels, and tugboats are capable of charging at the Port.

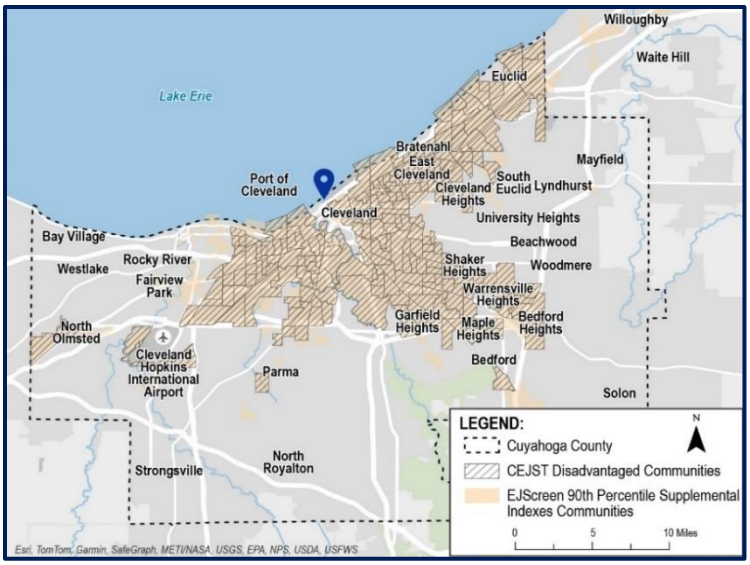


Figure 2. CEJST and EJScreen Disadvantaged Communities

- **Share of Project Activity:** The Project activity will be shared across multiple stakeholders. GLT and Shipyard will build locally and operate the next generation of all-electric tugboats within the greater Cleveland area. Logistec will operate and maintain a fleet of BE cargo handling equipment including forklifts, reach stackers, and an MHC. The Port will implement shore power for near-term usage by shipping operators while also building in flexibility for future vessels calling to Cleveland.
- **Does county contain $PM_{2.5}$ or ozone nonattainment area?** Yes

  If so, does it contain a severe or extreme nonattainment area? No
- **Does county contain $PM_{2.5}$ or ozone maintenance area?** Yes
- **Does county contain high ambient diesel PM concentration?** Yes

The County has 36 census tracts that have greater than or equal to the 90th percentile for diesel PM and are low income. Countywide, the average census tract is at the 58th percentile for diesel PM exposure and traffic proximity, the 70th percentile for $PM_{2.5}$, and the 38th percentile for travel barriers. Nearly half of census tracts within the County are low income and, therefore, are more susceptible to high medical care costs that can arise due to poor air quality. According to the World Health Organization, "air pollution is a risk for all-cause mortality as well as specific diseases. The specific disease outcomes most strongly linked with exposure to air pollution include stroke…lung cancer, [and] pneumonia."

Electrification of the Port will eliminate exhaust emissions such as CO_2, $PM_{2.5}$, and NO_x. This will, in turn, help to reduce the incident rate of air pollutant-related diseases within the County, thereby improving the health of residents in disadvantaged communities. As low-income individuals and people of color tend to disproportionately have higher incident rates of diseases and shorter lifespans, the Project investments will help reduce inequality to improve environmental justice.

To ensure the voices of all County residents, but especially disadvantaged communities, are incorporated within the Project design, the Port has conducted meaningful engagement that has consisted of a public board meeting, as well as the distribution of a Project fact sheet through Port newsletters and social media. Additional community engagement will occur throughout Project delivery that will entail regular community updates and opportunities to provide feedback.

a. Disadvantaged Communities: Nonattainment Areas

The Project is located within a county that meets the disadvantaged communities definition based on meeting the criterion that the entire county is located within an O_3 nonattainment area (Figure 3) and $PM_{2.5}$ maintenance area (Figure 4). However, the County is not located within severe or extreme nonattainment areas.

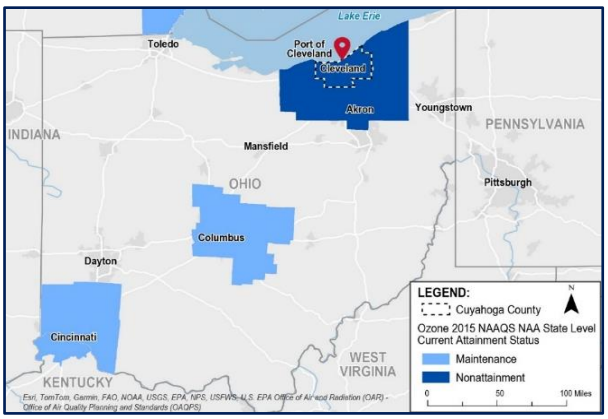


Figure 3. O_3 Nonattainment Area

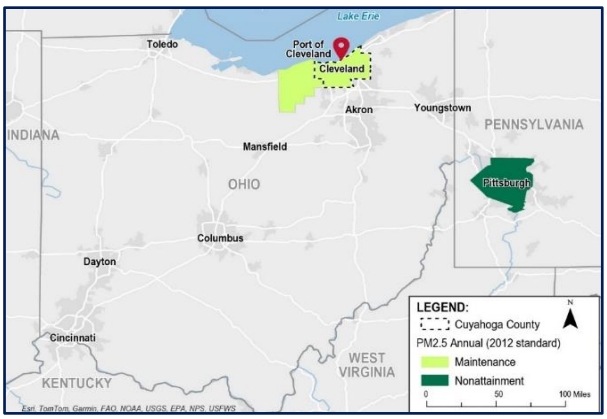
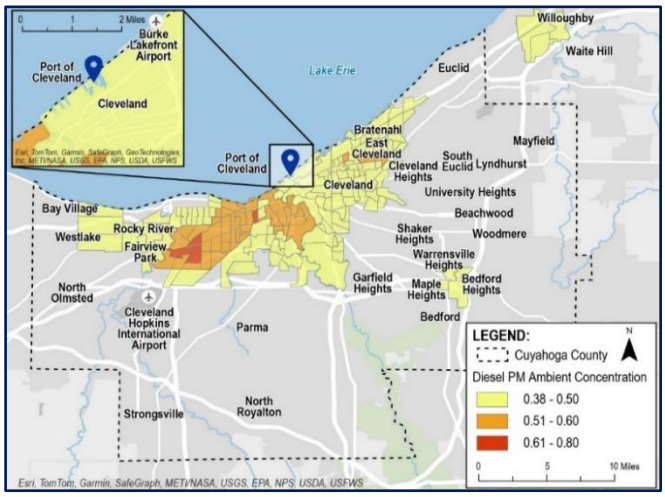


Figure 4. $PM_{2.5}$ Maintenance Area

b. Disadvantaged Communities: Areas with Air Toxics Concerns



The Project is located within a county (Figure 5) that meets the disadvantaged communities definition based on meeting the criterion that the county contains areas with air toxics concerns. The average diesel PM ambient concentration in the County is 0.35.

c. Community Engagement Prior to Application and During Project

Prior Community Engagement

During the Port's Strategic Plan development in 2023, the Port conducted interviews with over 40 local stakeholder organizations, with specific questions regarding the Port's community, social, and environmental impacts, as well as its communication regarding issues or concerns. Several themes arose from responses, including the need for additional equipment, namely another crane and reach stacker, concerns over the cost and reliability of electrified equipment, the desire for shore power infrastructure, and the pressure to reduce emissions to aid in companies' Environmental, Social, and Governance (ESG) and Climate Action goals. The Project is expected to address all these themes.

More specifically to the Project, the Port has conducted a presentation with the opportunity for public comment at its Board of Directors meeting on May 9, 2024. The Port's application has been featured in articles with several news organizations, including Crain's Cleveland Business and Energy News Network, and was discussed during a panel session at the 2024 Climate Leadership Conference in Cleveland. Furthermore, the Port will be distributing a fact sheet and an associated survey open to public comment via its upcoming quarterly newsletter in June.

Community Engagement During Project

The Port is committed to engaging with and soliciting community feedback. The Port's engagement plan includes the following items, which will be reported on through regular EPA grant reporting:

- Creating a Clean Ports program web page that describes the Project and its benefits; the website will include a clear point of contact to respond to community questions or concerns.
- Continuing to hold regularly scheduled board meetings with Clean Ports information and updates.
- Providing community updates through the Port's social media and active email listserv.

- Engaging local residents through job opportunities and mentorship programs, including its Davis Aerospace & Maritime (A&M) High School program described in Section 6.

d. Long-Term Community Engagement

Beyond the project period of performance, the Port is committed to long-term continuation of key efforts described above, including a web page promoting the Project, keeping zero-emissions planning efforts as a regular board meeting agenda item, and engaging with community and workforce development programs including with Davis A&M High School.

The Port has long-standing community engagement efforts that it will continue to prioritize and expand. The Port's community engagement is connected and immersed in a wide range of communities, neighborhoods, organizations, boards, foundations, programs and volunteer undertakings throughout Cleveland, Cuyahoga County, Ohio and the region. In addition, the Port and Port staff participate, often in leadership roles, in over 50 community, philanthropic, professional and industry organizations, boards, committees and programs. These organizations and efforts include advancement of local education, healthcare issues, sustainability, arts, youth mentoring, and more.

In 2018, the Port's Board of Directors adopted Resolution 2018-28 creating the Community Investment Fund ("CIF"), which is funded through the Port's development activities. The CIF Committee formulates recommendations to the Board, regarding programs and/or organizations to be community partners with the Port. The primary objective of the CIF is to provide economic opportunities for eligible entities that would otherwise not have access to capital for certain eligible activities and uses, and to otherwise spur broader and more equitable participation in port and maritime sector jobs. Under the program, the Port is authorized to use CIF funds to make grants and/or invest in educational, training and other programs contributing to the Fund goals.

Section 5. Project Sustainability

The Project will meet the program goals of emissions reduction planning by facilitating the implementation of the Master Plan, building upon Phase 1 implementation of the electrification hub funding through the FY22 PIDP grant. Project funding will ensure a partial transition of the Port's fossil fuel-powered equipment becomes ZE, helping to reduce total emissions. Ports around the nation, such as the Port of Guam, are conducting outreach with the Port to create their own ZE master plans.

a. Baseline Port Mobile Source Inventory for Greenhouse Gases (GHG), $PM_{2.5}$ and/or NO_x

The Port is committed to collecting a comprehensive GHG inventory every five years, and recently published its 2022 Air Emissions Inventory study, which presents an overview of calendar year 2022 emissions; this baseline inventory is detailed in Table 6. This activity-based inventory provides detailed information on the major mobile emission source categories associated with marine activities.

Table 6: Port-Related, On-Terminal Emissions

Sources	NO_x (tons)	PM_{10} (tons)	$PM_{2.5}$ (tons)	Diesel PM (tons)	VOCs (tons)	CO (tons)	SO_2 (tons)	CO_2e (tons)
Ocean-going Vessels	69	1.4	1.3	1.1	2.7	6.9	3.2	5,066
Harbor Craft	6	0.1	0.1	0.1	0.1	1.3	0.0	702
Cargo Handling Equipment	7	0.7	0.7	0.7	1.0	2.9	0.0	1,684
On-road, Heavy-duty Trucks	1	0.0	0.0	0.0	0.1	0.4	0.0	155
Locomotive Switcher	0	0.0	0.0	0.0	0.0	0.0	0.0	1
Total	**83**	**2.3**	**2.1**	**2.0**	**3.9**	**11.5**	**3.3**	**7,609**

b. Plan to Reduce Port Mobile Source Emissions

The Port's CAP establishes a framework for the Port to achieve its overarching goal of net-zero GHG emissions by 2050. The plan closely aligns with local, state, and federal decarbonization efforts and the

Port's own Strategic Plan. In the near term, the Port will collaborate closely with community, industry, and regulatory partners to establish interim emissions reduction targets and identify priority action items that will be implemented through the Climate Action Implementation Plan.

To achieve the overall net-zero GHG emissions goal, the Port will address the following emission types:

- Direct emissions from fossil fuel used by equipment, vehicles, and buildings owned by the Port.
- Indirect emissions associated with generating the electricity consumed by the Port, mostly from buildings.
- Direct emissions from fossil fuel used by equipment and vehicles not owned by the Port. These emissions include ships at berth, harbor craft, terminal equipment owned and operated by stevedore operators, and on-terminal truck and locomotive emissions.

Section 6. Job Quality and Equitable Workforce Development

The Port and partners anticipate that Project funding will result in new jobs. To the practical extent possible, local workers will be hired. The Port and partners will leverage existing local workforce development programs to train workers to have ZE operating and maintenance skills.

a. Supporting High-Quality Jobs

The Port of Cleveland is the only local government agency whose sole mission is to spur job creation and economic vitality in Cuyahoga County. The Port is an economic engine for the community, a key to Northeast Ohio's global competitiveness, and a crucial partner in building Cuyahoga County's future.

The Port is committed to leveraging the Clean Ports program to provide high-quality jobs while supporting workers with training for the installation, operation, and maintenance of new infrastructure through the following:

- A collaboration with Davis A&M High School to provide paid internships and workforce training programs that utilize Clean Ports-installed equipment, including ZE mobile equipment and the new renewable energy systems. The Port has a long relationship with Davis A&M, including through ongoing maritime education programs and through the provision of funding and grants.
- Adherence to the Port's stringent existing worker safety program.
- Regular engagement with the Port workforce to help align project planning and implementation with worker needs. Key areas for discussion will include the impact of equipment charging on worker schedules, ensuring that workers feel safe operating new equipment, and ensuring that any new responsibilities for operating new equipment are allocated fairly.
- Paying competitive wages. The Port's existing policy is to pay employees the local prevailing wage for their occupation and plans to continue to do so throughout the project duration. The Port has instituted a Prevailing Wage requirement for construction contracts and instituted a $15 per hour minimum wage floor for all firms doing business with the Port.

b. Expanding Access to High-Quality Jobs, Including for People in Low-Income and Disadvantaged Near-Port Communities

The Port is committed to supporting economic development for disadvantaged communities in the region. Examples of the Port's commitment include the following:

- The Port has a 30% MBE/FBE participation goal for all Port projects.
- In the summer of 2024, the Port will host its first MBE/FBE supplier diversity outreach event to further improve awareness of opportunities and connect suppliers with each other.
- The Port conducts regular outreach to low-income and disadvantaged communities through extensive engagement in professional and community organizations throughout the region. The Port and Port staff participate, often in leadership roles, in over 50 community, philanthropic, professional and industry organizations, boards, committees and programs.

- The Port is committed to creating a mentorship program through its ongoing relationship with Davis A&M to provide students from disadvantaged backgrounds with exposure to ZE equipment maintenance and operations.
- The Port is independently funding the planning and design for the construction of a Maritime Learning & Resource Center as an annex to Warehouse A for students.

Section 7. Project Resilience to Climate Impacts

According to the U.S. DOT Equitable Transportation Community Explorer, the Project tract ranks in the 94th percentile for the Climate & Disaster Risk Burden. The Port is dedicated to using clean, renewable energy sources, specifically solar canopies paired with BESSs, for various operations, including EV charging and shore power. This commitment aligns with broader efforts to combat climate change. To further enhance energy efficiency and operational resiliency, the Port is investigating stationary BESSs. These systems will store excess solar power during periods of cloud cover or nighttime, reducing reliance on retail grid power, which can be affected by climate-related events.

Climate change presents a significant challenge to the Port's dependence on the electrical grid, as it increases the probability of operational disruptions during power outages. As a mitigation measure, the Port is actively assessing and implementing power resilience measures such as smart charging. By leveraging a charging management system, the Port will be able to identify which charging systems are critical during emergency operations to concentrate backup power on these specific systems.

Ongoing projects incorporate aspects to improve resiliency and prepare for extreme weather events. On the Warehouse A Modernization Project, the Port is designing stormwater management and treatment aspects with climate change in mind to ensure the Port is well-prepared for future changes in lake levels, precipitation, and stormwater regulations. To provide resiliency against rising sea levels, the FY19 PIDP project raised docks 2' in elevation. As an extra cautionary measure, the Project will situate charging infrastructure far from dock walls.

In 2023, the Port distinguished itself as the first port in the Great Lakes to adopt a CAP, with the goal of achieving net ZE by 2050. This plan will help allocate resources to build resilience against climate change impacts such as increased storm intensity and heavy rainfalls, while simultaneously helping decarbonize the Port. These strategies work to address the immediate needs of the Port, but also consider the long-term impacts of climate change, ensuring the Port's operations remain both sustainable and resilient.

Section 8. Budget

a. Budget Detail

The detailed budget is provided in tabular format within the Detailed Budget Table attachment. The Project total amounts to $104,734,587. The Port's cost estimates for mobile cargo handling equipment charging infrastructure installation, shore power and dock electrical connections, and the solar microgrid project, are based on engineering consultant-produced final design, construction cost estimate, and basis of design documents completed in fall 2023. The 15% design drawings were also produced in 2023, detailing the required on-terminal electrical and civil infrastructure work required to achieve full terminal electrification.

The budgets for DC charging system procurement and installation, shore power connections, and MHC connections are all based on budgetary quotes obtained from manufacturers and providers. Conceptual designs and cost estimates consider current and future market conditions, such as recent labor, material costs, and escalation. Due to the Project's conceptual design basis, the budget has included contingency.

Mandatory Cost Share

The Port is prepared to meet cost share requirements as required by EPA, with matching funds offered by the Port's Project partners, Logistec and GLT. The total Project budget is $104,734,587 with a cost share of $10,473,459 from the Port and its partners.

- Port of Cleveland; Total Amount: $38,219,973; Cost Share $3,821,997

- Logistec; Total Amount: $28,487,232; Cost Share: $2,848,723
- GLT; Total Amount: $38,027,382; Cost Share: $3,802,738

The Port has demonstrated experience in obtaining and providing matching funds for federal grant programs. For the FY22 PIDP grant award, the mandatory cost share was provided through the Ohio DOT Maritime Assistance Program. The Port has also partnered with Logistec and GLT on successful DERA applications, including a FY17 grant to repower tugboats and a FY21 grant to replace a loader at the Cleveland Bulk Terminal. Letters of commitment from Logistec and GLT are included as an attachment.

Target Apportionment Among Cost Categories

The Port's proposed Project budget achieves the target apportionment of a minimum 50% of total Project costs for expenses related to the purchase and installation of ZE equipment and shore power infrastructure for vessels. Of the total $104,734,587 Project budget, $85,793,275, or 82%, is directly allocated for the procurement and installation of ZE cargo handling equipment, shore power equipment, ZE vessels (tugboats), and charging equipment.

Table 7. Budget Table

Cost Type	Category	Year 1	Year 2	Year 3	Year 4	Project Total	Non-federal Cost Share
Direct Costs	Total Personnel, Fringe Benefits, and Travel	*$0*	*$0*	*$0*	*$0*	*$0*	$0
	Equipment						
	BE Container Reach Stacker Equipment and charging infrastructure						
	• Two BE 99,000 Pound Container Reach Stackers with 985kWh battery pack, BABA compliant @ $2,193,063 each. **			$4,386,125		$4,386,125	$438,613
	• Two 180kW DC Chargers each with one CCS1 DC Dispensers for Reach Stacker Charging, BABA compliant @ $108,399. **		$216,798			$216,798	$21,680
	Dock 24E Shorepower Cable Management and Connection Equipment						
	• MCMS – 11/6.6KV with cabling for a 150-foot trench. **		$1,840,000			$1,840,000	$184,000
	• Shore Power Connection Point Equipment (Outlet Assembly) and Shore-to-Ship Communication and control cable. **		$422,280			$422,280	$42,228
	• Dockside containerized 400V power equipment and medium voltage 6.6kV electrical distribution equipment for Shorepower at Dock 24E. **		$1,900,306			$1,900,306	$190,031
	Docks 24W, 24E, and 26W MHC power supply and connection equipment						
	• MHC Connection Point Equipment (Outlet Assembly) @ $322,920 / berth		$968,760			$968,760	$96,876
	• Medium Voltage 12kV breakers for existing 12kV substation switchgear. One breaker per berth @ $34,000 each		$126,684			$126,684	$12,668
	Total Equipment	*$0*	*$5,474,828*	*$4,386,125*	*$0*	*$9,860,953*	*$986,095*
	Supplies						
	One desktop computer and monitor screen to operate and observe charger management software (CMS) for mobile cargo handling equipment DC charging equipment		$2,500			$2,500	$250
	Three BE vehicle high voltage PPE stations (gloves, shepherd's hook, lock out tag out station etc.) @ $800 each		$2,400			$2,400	$240
	Total Supplies	*$0*	*$4,900*	*$0*	*$0*	*$4,900*	*$490*
	Contractual						
	Consultant Staffing to support program management of the grant award and implementation of the project @ 1,000 hours per year and $180/hour	*$180,000*	*$180,000*	*$180,000*	*$180,000*	$720,000	$72,000

Cost Type	Category	Year 1	Year 2	Year 3	Year 4	Project Total	Non-federal Cost Share
	Consultant Staffing to support Construction manager for the implementation of the project @ 1,500 hours per year and $200/hour		*$300,000*	*$300,000*		$600,000	$60,000
	Design and Engineering (DE) Consultant for development of plans, specifications, and engineered drawings (PS&E) for shorepower connection and associated on-terminal electrical upgrades (8.5% of construction budget)	$201,028				$201,028	$20,103
	DE Consultant for development of plans, specifications, and engineered drawings (PS&E) for dockside MHC connections and associated on-terminal electrical upgrades (8.5% of construction budget)	$732,275.00				$732,275	$73,228
	DE Consultant for development of plans, specifications, and engineered drawings (PS&E) for the installation of forklift and reach stacker DC charging systems, overhead shade canopy, and associated on-terminal electrical upgrades (8.5% of construction budget)	$140,560				$140,560	$14,056
	DE Consultant for development of plans, specifications, and engineered drawings (PS&E) for the Warehouse A Rooftop Solar and Microgrid Project (8.5% of construction budget)	$1,105,932				$1,105,932	$110,593
	Total Contractual	*$2,359,794*	*$480,000*	*$480,000*	*$180,000*	*$3,499,794*	*$349,979*
	Construction						
	Warehouse A Rooftop Solar and Microgrid Project						
	• 7.8MWh Stationary BESS. **			*$5,037,059.50*		$5,037,060	$503,706
	• 2.15MW PV Module and Inverters. **			*$6,898,700*		$6,898,700	$689,870
	• Structural Roof Upgrades for PV Solar		*$1,075,200*			$1,075,200	$107,520
	Installation of overhead shade and weather canopy over DC chargers		*$336,460*			$336,460	$33,646
	Reach Stacker DC charger System Installation		$526,873			$526,873	$52,687
	On-Terminal Electrical and Civil construction for Shorepower Connections at Dock 24E.						
	• Installation of Medium Voltage electrical cabling from existing Warehouse A 12kV substation		*$906,618*			$906,618	$90,662
	• Installation of new 6.6kV medium voltage switchgear and transformers		*$42,000*			$42,000	$4,200
	• Installation of a containerized dockside 400V supply equipment for shorepower		*$65,000*			$65,000	$6,500
	• Civil berth demolition, new electrical vaults, wharf pavement reconstruction, and cable trenching for shorepower MCMS at one berth		*$1,351,415*			$1,351,415	$135,142
	On-Terminal Electrical and Civil Construction for dockside electrical power connections at Docks 24W, 24E, and 26W for electric MHCs.						
	• Installation of Medium Voltage electrical cabling from existing Warehouse A 12kV substation		$255,000			$255,000	$25,500
	• Civil berth demolition, new electrical vaults, wharf pavement reconstruction, and cable trenching for MHC's cable management systems at three berths		$8,360,000			$8,360,000	$836,000
	Total Construction	*$0*	*$12,918,566*	*$11,935,760*	*$0*	*$24,854,326*	*$2,485,433*
	Other-Subaward						
	Subaward: Great Lakes Towing						
	• Two BE Tugboat with 3MWH onboard battery storage and rated to 30 ton bollard pull. BABA compliant @ $12,224,199 each			$24,448,398		$24,448,398	$2,448,398
	• Two 2MW DC charger system, BABA Compliant with medium voltage grid input and two 2MW 1000VDC outputs @ $1,490,400 each. *		$2,980,800			$2,980,800	$298,080
	• Two shore mounted Megawatt Charging Standard (MCS) compliant cable reels @298,080 each. *		$596,160			$596,160	$59,616

Cost Type	Category	Year 1	Year 2	Year 3	Year 4	Project Total	Non-federal Cost Share
	• Medium Voltage 12kV Utility Upgrade to tugboat berths	$450,000				$450,000	$45,000
	• 7.8MWh Stationary BESS. *			*$5,352,024*		$5,352,024	$535,202
	• Design, engineering, and construction for electrical and civil site upgrades for 2MW charging system and new medium voltage power distribution	$4,200,000				$4,200,000	$420,000
	Subaward: Logistec						
	• Two BE 36,000 Pound Forklifts with 246kWh battery pack, BABA compliant @ $1,077,755. *			$2,155,510		$2,155,510	$215,551
	• Four BE 55,000 Pound Forklifts with 369 kWh battery pack, BABA compliant @ $1,639,440 each. *			$6,557,760		$6,557,760	$655,776
	• Four BE 65,000 Pound Forklifts with 369kWh battery pack, BABA compliant @ $1,878,525 each. *			$7,514,100		$7,514,100	$751,410
	• Five 180kW DC Chargers with ten CCS1 DC Dispensers for Forklift Charging, BABA compliant @ $137,390 each. *		$686,950			$686,950	$68,695
	• Forklift DC charger System Installation		*$1,317,183*			$1,317,183	$131,718
	• Freight costs for ten forklifts to Cleveland, Ohio @ $13,700 each. *			$137,000		$137,000	$13,700
	Subaward: Logistec for one MHC						
	• One BE MHC, 150 ton capacity @ $8,616,530 each. *			$8,616,530		$8,616,530	$861,653
	• Final assembly of MHC in Cleveland. *			$621,000		$621,000	$62,100
	• Freight costs for MHC to Cleveland. *			$881,199		$881,199	$88,120
	Total Other	*$4,650,000*	*$5,581,093*	*$56,283,521*	*$0*	*$66,514,614*	*$5,900,051*
	Total Direct	*$7,009,794*	*$24,459,387*	*$73,085,406*	*$180,000*	*$104,734,587*	*$10,473,459*
	Total Indirect	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
	Total Funding	***$7,009,794***	***$24,459,387***	***$73,085,406***	***$180,000***	***$104,734,587***	***$10,473,459***

*Includes 8% tax and 15% contingency
**Includes 15% contingency

Expenditure of Awarded Funds

Approach

The Port will leverage its significant pre-application planning and due diligence work to ensure the timely implementation of Project activities and expenditure of awarded funds. These activities have included extensive utility coordination and electrification planning, consultation with numerous equipment vendors, equipment loading analyses, and preparation of draft subaward agreements.

Procedures

Once a cooperative agreement with the EPA is executed, the Port will execute already-drafted subaward agreements with both Logistec and GLT and begin the procurement process for critical path items, including design, project management services, and pieces of equipment with long lead times. For subaward activities, Project partners will be required to provide documentation of proper procurement procedures, disadvantaged business engagement efforts, proof of payment, proof of scrappage as applicable, and semi-annual and final reports before submitting invoices to the Port for approved reimbursable costs. Project partners may not make changes to equipment or timelines without prior written approval from the Port.

Controls

The Port is fully staffed with a qualified finance and accounting group that is audited annually. In 2023, the Port was one of approximately 4% of audited companies in Ohio to be awarded the Ohio State Auditor's Award for Financial Excellence underscoring its financial health and exemplary management.

b. Reasonableness of Costs

Personnel

The Port intends to contractually procure experienced and knowledgeable consultant staffing support through a competitive procurement process. Additional Port-staffed personnel are not anticipated as part of this budget request. Total personnel costs are $0.

Fringe Benefits

The Port intends to contractually procure experienced and knowledgeable consultant staffing support, who have successfully managed complex electric vehicle deployments. Total fringe costs are $0.

Travel

No domestic or international travel is anticipated to deliver the Project. Total travel costs amount to $0.

Equipment

Direct Port equipment costs for the Project amount to $9,860,953, purchased in the next 3 years, including a 15% contingency on all costs noted below. The program's equipment needs are split between three categories as follows:

- Electric Container Reach Stacker Equipment and Charging Infrastructure ($4,602,923):
  - Equipment: The Port plans to procure two pieces of BE container reach stacker equipment, each rated up to a 99,000-pound capacity with approximately 985 kWh of onboard battery storage. Quotes from two BABA-compliant manufacturers informed the pricing as part of this application. The price for the equipment is $2,193,063 each, total of $4,386,125 with 15% pricing contingency.
  - Charging Infrastructure (180kW DC Charging Systems): The Port will procure two 180kW DC charging systems with CCS connectors to serve the two reach stackers. Multiple cost quotes were obtained from BABA-compliant manufacturers. Pricing for the chargers is $108,399 each for $216,798 with 15% contingency.
- Shore Power Cable Management, Cable Connection, and Electrical Equipment for Dock 24E ($4,162,586):
  - MCMS: Budgetary pricing for similar systems was obtained from one vendor, although a BABA-compliant version was not available. Additionally, it is anticipated that this equipment purchase will constitute less than 5% of the total program budget. Pricing for the MCMS equipment totals $1,840,000 including 15% pricing contingency.
  - Equipment: Specialized shore-to-ship communication equipment and electrical shore power outlet connection equipment will be necessary to achieve reliable shore power infrastructure at Dock 24E. Shore-to-ship communications equipment will be located with the power infrastructure and provide flexibility to vessel varieties. Pricing totals $422,280 with 15% contingency.
  - Medium-voltage 6.6kV Power Equipment and Containerized 400V Power Equipment: Pricing was obtained from electrical distribution equipment vendors. Total $1,900,306 with 15% contingency.
- MHC Power Supply and Connection Equipment at Docks 24W, 24E, and 26W ($1,095,444):
  - MHC Connection Point Equipment: Specialized connection outlet assembly equipment and medium-voltage 12kV electrical connection equipment will serve the new MHC at Docks 24W, 24E, and 26W, which is where the existing duct banks and electrical infrastructure are already installed and ready to be used. Pricing per berth for this equipment is $322,920 for a total of $968,760 including 15% contingency.
  - Medium-voltage 12kV Power Equipment for MHC Berth Connections: Pricing was obtained from electrical distribution equipment vendors. Pricing per 12kV breaker to feed one berth for this equipment is $34,000 each for a total amount of $126,684.

Supplies

Total supplies costs amount to $4,900. To deploy new BE mobile cargo handling equipment and ensure optimal uptime and usage of the collective groups of DC charging systems, the Port requests the following:

- One new desktop computer and monitor ($2,500) for the purposes of operating and monitoring the charger management systems software controlling the new DC charger systems.
- Three PPE stations ($800 each) with adequate high-voltage safety equipment and supplies, including lock-out/tag-out supplies, high-voltage gloves, and electrical shepherd's hooks. PPE stations will be in the equipment maintenance shop, Warehouse A, and Warehouse 24.

Contractual

The Port will procure up to six contracts, a total value of $3,499,794:

- A professional services contract will be procured to obtain experienced and knowledgeable staff to support program management of the grant award, infrastructure development project management, and program implementation. This contract's total amount is $720,000 and is based on 1,000 consultant hours per year, at $180 per hour averaged, for the 4 years of the program.
- A professional services contract will be procured to obtain experienced and knowledgeable staff to provide construction management and project management. This contract's total amount is $600,000 and is based on 1,500 consultant hours per year, at $200 per hour averaged, for 2 years of the program during construction and deployment.
- A design-engineering (DE) services contract will be procured for the development of PS&E for shore power connections and associated on-terminal electrical upgrades. This contract's total amount is $201,028 and is based on 8.5% of the budgeted construction costs for this scope of work, detailed as part of the engineer estimates performed for the Port in 2023.
- A DE services contract will be procured for the development of PS&E for dockside MHC connections and associated on-terminal electrical upgrades. This contract's total amount is $732,275 and is based on 8.5% of the budgeted construction costs for this scope of work, detailed as part of the engineer estimates performed for the Port in 2023.
- A DE services contract will be procured for the development of PS&E for the installation of forklift and reach stacker DC charging systems, overhead shade canopy of the charger pedestals, and associated on-terminal electrical upgrades. This contract's total amount is $140,560 and is based on 8.5% of the budgeted construction costs for this scope of work, detailed as part of the engineer estimates performed for the Port in 2023.
- A DE services contract for the development of PS&E for rooftop solar array, BESSs, and microgrid controllers at Warehouse A. This contract's total amount is $1,105,932 and is based on 8.5% of the budgeted construction costs for this scope of work, detailed as part of the engineer estimates performed for the Port in 2023.

Construction

Total construction costs for the Project amount to $24,854,326. In 2023, the Port procured a cost estimating and engineering consultant to develop sealed engineer class-5 cost estimate for various future construction phases. This cost estimate is attached and considers escalation and markup assumptions: General Requirements (6%), Mobilization (3%), Overhead and Profit (15%), Bonds and Insurance (2.17%), Contingency (12%), and Escalation (2.75%). Planned construction work for this program includes the following:

- Warehouse A Rooftop Solar and Microgrid Project amounting to $13,010,960:
  - BESS: This scope was not included in the 2023 cost estimate, but vendor pricing for BESS was obtained, including installation, and was budgeted at $5,037,060 with 15% pricing contingency.
  - Solar PV Module and Inverters: This scope was estimated on the 2023 engineer's cost estimate with a construction cost of $6,898,700 for a 2.15MW roof-mounted system with required building structural modifications to accommodate the new load.

  - Structural Roof Upgrades for PV Solar: $1,075,200
- Overhead Shade and Weather Canopy over DC Chargers: This scope was estimated on the 2023 engineer's cost estimate with a construction cost of $336,460 for new canopies on the west face of Warehouse A to provide shade and weather protection for the DC charging pedestals and operators.
- DC Charging Systems Installation for Reach Stackers: This scope was included in the 2023 cost estimate. The cost for construction and installation estimated per 180kW charger was budgeted at $263,437 per charger totaling $526,873 for two 180kW BABA-compliant DC fast chargers for the planned container reach stacker mobile cargo handling equipment.
- On-terminal Electrical and Civil Construction for Shore Power Connections at Dock 24E: This scope was estimated on the 2023 engineer's cost estimate with a total equipment and construction cost of $7,722,243 for Dock 24E. This cost was also inclusive of MHC connection construction installation costs. The shore power Dock 24E construction and equipment costs are split between this construction cost of $2,365,033 and the 24E shore power equipment costs of $4,162,586 (detailed in the "Equipment" cost section). The construction scope encompasses the following:
  - Installation of new medium-voltage electrical cabling from Warehouse A 6.6kV substation.
  - Installation of new 6.6kV medium-voltage switchgear and transformers.
  - Installation of a containerized dockside 400V supply equipment for shore power.
  - Civil berth demolition, new electrical vaults, wharf pavement reconstruction, and trenching for shore power MCMS at one berth.
- On-terminal Electrical and Civil Construction for Dockside Electrical Power Connections at Dock 24W, 24E, and 26W for Electric MHCs: This scope was based on the 2023 engineer's cost estimate with total equipment and construction cost data for Docks 24E, 24W, and 26W MHC power connections, which included shore power pedestal upgrade costs. The MHC portion of the estimate is $9,710,444 in total construction and equipment costs for the three docks. The $1,095,444 equipment costs are detailed in the "Equipment" section of this application. The $8,615,000 construction scope encompasses the following:
  - Installation of new medium-voltage electrical cabling from Warehouse A 12kV substation.
  - Civil berth demolition, new electrical vaults, wharf pavement reconstruction, and trenching for MHC's cable management systems at three berths.

Other

Subaward Projects to Implementation Partners

Subawards to local implementation partners will total $66,514,614, as described below.

Logistec

Logistec will procure 10 new BE heavy-duty forklifts ranging from 36,000 to 65,000 lbs and associated DC charging systems to electrify almost 50% of the Port's forklift fleet at the General Cargo Terminal. Logistec plans to procure a single new BE MHC separate from the forklifts. The total subaward for Logistec is $29,796,567. The elements of the program that will be subawarded include the following:

- ZE Mobile Cargo Handling Equipment ($18,368,503). Unless otherwise noted, cost estimates were derived from BABA-compliant manufacturer quotes. An 8% local tax as well as a 15% contingency is included in all prices below.
  - Two BE 36,000-pound Forklifts: Logistec will procure two BE forklifts rated up to a 36,000-pound capacity and using approximately 246kWh of onboard battery storage. The price is $1,077,755 each, for a total of $2,155,510.
  - Four BE 55,000-pound Forklifts: Logistec plans to procure four BE forklifts rated up to a 55,000-pound capacity and using approximately 369kWh of onboard battery storage. The equipment price is $1,639,440 each, for a total of $6,557,760.

  - Four BE 65,000-pound Forklifts: Logistec plans to procure four BE forklifts rated up to a 65,000-pound capacity and using approximately 369kWh of onboard battery storage. The equipment price is $1,878,525 each, for a total of $7,514,100.
  - Five 180kW DC Chargers each with Two CCS1 Dispenser Pedestals for Forklift Charging: To support the BE cargo handling equipment, Logistec plans to procure five 180kW DC charging systems, with CCS connectors, to serve the 10 forklifts. The chargers cost $137,390 each, for $686,950.
  - Forklift DC Charger System Installation: This scope was included in the 2023 engineer's cost estimate performed for the Port. The cost for construction and installation estimated per 180kW charger was budgeted at $263,437 per charger totaling $1,317,183 for five 180kW BABA-compliant DC fast chargers for the planned forklift mobile cargo handling equipment.
  - Freight Costs for 10 Forklifts to Cleveland, Ohio: Freight costs were provided by the BABA-compliant forklift manufacturer and budgeted at $13,700 per forklift for a total of $137,000.
- ZE MHC ($10,118,729) (For program scalability, the MHC is separate from the forklifts.)
  - BE 150-ton MHC: Logistec plans to procure one fully ZE BE MHC rated up to a 150-ton capacity. Budgetary quotes from two manufacturers were obtained and used to inform the pricing as part of this application. The price for the equipment totals $8,616,530. It is assumed that the MHC's final manufacture in the U.S. would meet the requirements as set forth by EPA for eligibility.
  - Final Assembly of MHC in Cleveland, Ohio: Final assembly costs and levels of effort were estimated by MHC manufacturers for assembly in Cleveland and were budgeted by the crane supplier at $621,000.
  - Freight Costs: Freight costs were provided by MHC manufacturers and budgeted at $881,199.

Great Lakes Towing Company

The total subaward for GLT is $38,027,382. The elements are as follows:

- Two BABA-compliant BE Tugboats with 3MWh Onboard Battery Storage and Rated to a 30-ton Bollard Pull: Shipyard has designed an industry-leading BE ZE tugboat with BABA-compliant battery systems with up to 3MWh of onboard energy storage. The estimated build costs are $12,224,199 per vessel, totaling $24,448,398.
- Two 2MW DC Charging Systems: To maintain the same level of service and operating windows as the current Port tugboat operation, the tugboats will need to be charged to the maximum charge rate of the battery systems, which is 1.5MW. The Port has reached out to BABA-compliant suppliers and received budgetary pricing for a 2MW system at $1,490,400 each for a total amount of $2,980,800.
- Two Shore-mounted MCS-compliant Cable Reels: $298,080 each, for a total amount of $596,160.
- Medium-voltage 12kV Utility Upgrade to the Tugboat Berths: Working with CPP, the upgrade costs are estimated at $450,000 for the necessary upgrade equipment and utility crew labor.
- 7.8MWh BESS: Vendor pricing obtained for construction of and equipment for this system is $5,352,025, inclusive of an 8% tax and 15% pricing contingency.
- Design, Engineering, and Construction for Electrical and Civil Upgrades for Two 2MW Charging Systems, MCS Cable Reels, and New Medium-voltage Power Distribution: $4,200,000. Cost estimate was developed based on historical construction costs from previous 500–1,000kW transit bus DC charging projects in the U.S.

Direct Costs

Direct charges are equivalent to all the previously listed categories (travel, contractual, construction, and subawards) at a total value of $104,734,587.

Indirect Charges

The Port anticipates that indirect costs will not be part of this budget request. Total indirect costs are $0.