

NOFO #693JJ323NF00005

Reduction of Truck Emissions at Port Facilities

Due Date: 7/26/2023

Volume 1 – Technical Application



Prepared for:

US Department of Transportation
Federal Highway Administration

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Volume 1 – Technical Application

SECTION I - COVER PAGE AND TABLE OF CONTENTS

Project Name	Maryland Port Administration Reduction of Heavy-Duty Emissions – Equipment Replacement and Planning
Eligible Entity Applying to Receive Federal Funding	Maryland Port Administration
Total Project Cost (from all sources)	\$ 917,512
Reduction of Truck Emissions at Port Facilities Grant Program funding request (Federal share)	\$ 642,258
Are matching funds restricted to a specific project component? If so, which one?	No
State(s) in which the project is located	Maryland
Is the project currently programmed in the: <ul style="list-style-type: none"> • Transportation Improvement Program • Statewide Transportation Improvement Program • Metropolitan Planning Organization Long Range Transportation Plan • State Long Range Transportation Plan • State Freight Plan 	No. However, if selected for an award, MPA would apply to have the project added to the Statewide Transportation Improvement Program.
Methods used to reduce truck emissions (briefly describe)	<p>Purchase of a new Zero Emission Street Sweeper truck to replace an existing diesel-powered Street Sweeper truck.</p> <p>A planning effort to research and promote wider adoption of electric Power Take Off (ePTO) devices on car carrier trucks to eliminate idling of diesel engines while loading/unloading of passenger vehicles.</p>

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SECTION II - PROJECT NARRATIVE

A. SUMMARY

The Maryland Port Administration proposes replacement of one (1) diesel-powered street sweeper with one (1) zero-emission unit. A planning effort is also proposed to promote adoption of electric Power Take Off (ePTO) devices on carrier trucks operating chassis hydraulics. Most car carrier fleets use mechanical PTOs, averaging two hours of engine idling per trip. The Port of Baltimore is the #1 port in the country in the cars and light truck category; therefore, wider adoption of ePTOs will significantly reduce idling.

Table 1 – Eligibility Criteria and Goals

Eligibility Criteria	Project	Meets Criteria
Entities that have authority over, operate or utilize port facilities and intermodal port transfer facilities	Maryland Port Administration	✓
Project locations within or adjacent to ports and intermodal port transfer facilities	Port of Baltimore – Terminals and adjacent public roads	✓
Cost Share or Match	Provided by the State of Maryland	✓

Table 2 Means to Achieve RTEPF Program and Administrative Goals

Means to Achieve RTEPF Grant Program Goal	Implemented/Addressed by Application (Check all that apply)
1. Promoting development of port-related infrastructure that reduces emissions from port-related truck idling, including the electrification of port operations, which can include truck parking electrification	✓
2. Promoting development of on-truck technologies that reduces emissions from port-related truck idling	✓
3. Promoting use of zero or low emissions powertrains or fuels on trucks	✓
4. Reducing truck congestion within or adjacent to ports, which can include promoting enhanced rail intermodal connections at ports	
5. Other improvements that reduce port-related emissions from idling trucks, including through the advancement of port electrification and improvements in efficiency, focusing on port operations, including heavy-duty commercial vehicles, and other related projects.	✓
Administration Goals	Implemented/Addressed by Application (Check all that apply)
1. Safety	✓
2. Climate Change and Sustainability	✓
3. Equity and Justice ⁴⁰	✓
4. Workforce Development, Job Quality, and Wealth Creation	✓

B. INTRODUCTION AND BACKGROUND INFORMATION

1. Introduction

The Maryland Port Administration (MPA) requests a Fiscal Year (FY) 2023/2024 grant from the Reduction of Truck Emissions at Port Facilities (RETPF) Grant Program, administered by the U.S. Department of Transportation (USDOT) Federal Highway Administration (FHWA). MPA proposes two efforts to reduce emissions from heavy duty diesel vehicles at port facilities. The first is a deployment grant, for replacement of a diesel-powered vehicle with a zero-emission

vehicle. The second is a planning effort to research and promote development of more robust electric power take off (ePTO) units in place of mechanical power take off units. Most car carrier fleets that service the Port of Baltimore use trucks with mechanical PTOs, resulting in constant truck idling for up to two hours per trip while the vehicles are loading or unloading at the terminal.

2. Background

Founded in 1706, the Port of Baltimore, located in the Chesapeake Bay, Maryland, is the nation's leading automobile and roll-on/roll-off (RoRo) port and handles containers, passengers, automobiles, bulk cargo, and farming equipment. Located in one of the country's strongest urban markets, the Port is also an important gateway for the import and export of cargo to and from rural areas, including heavy farming equipment, such as combines, tractors, and hay balers, providing critical connectivity between domestic and international markets and serving as a vehicle for industrialization, modernization, and growing both the urban and rural economies.

The [Port of Baltimore](#) is an intermodal port, with proximity to two major interstates - I-95 and I-70, and two Class I rail carriers - Norfolk Southern and CSX. All major RoRo carriers call the Port of Baltimore, ensuring vehicles can reach any destination.

The two main public terminals at the Port of Baltimore receiving most of the RoRo cargo, including automobiles as well as other vehicles such as tractors, farm equipment and rolling stock, are the Dundalk Marine Terminal and the Fairfield/Masonville Terminal. Dundalk Marine Terminal has approximately 300 acres devoted to automobiles and other RoRo cargo. Fairfield/Masonville has 160 acres devoted to auto processing and handling, along with an adjacent 250 acres of space privately owned by Chesapeake and Atlantic auto terminals. Combined auto handling terminals in the port offer 710 acres (about the area of Central Park in New York City) for autos and RoRo cargo.

According to '[The 2017 Economic Impact of the Port of Baltimore in Maryland](#)', the overall economic impact of the Port, measured for cargo and cruise activity, is as follows:

- Approximately 37,297 jobs in Maryland are generated by Port activity, including 15,329 direct jobs, 16,780 induced jobs, and 5,188 indirect jobs.
- Approximately 101,880 other jobs in Maryland are related to activities at the Port.
- When combining direct, induced, and indirect jobs with related jobs, there are more than 139,170 jobs linked to the Port, including jobs in the outlying rural areas.

As an emissions reduction deployment initiative, the Port of Baltimore proposes replacement of a State-owned diesel-powered street sweeper truck with a zero-emission unit. The current diesel-powered street sweeper is used on multiple terminals at the Port, including Dundalk Marine Terminal, North and South Locust Point Terminals, and the Fairfield/Masonville Terminal. The street sweeper travels over the road from terminal to terminal to clean surfaces and as such is used in both Baltimore City and Baltimore County. This grant request thus provides an opportunity to eliminate the emissions from this diesel-powered vehicle and reduce the emission

impacts on the port’s neighboring communities. MPA would also install a charging station to power the street sweeper, to support zero emission equipment usage at the Port.

As an emissions reduction planning initiative, the MPA proposes to assemble a team of the following to foster development and utilization of more robust electric Power Take Off (ePTO) devices for car carrier operations:

- Car carrier fleet owners, including those who have expressed interest in ePTOs;
- Manufacturers of car carrier trucks and ePTOs;
- Retrofitters who can install ePTOs;
- Car hauler manufacturers;
- Port staff;
- Consulting staff with experience in electric fleet operations; and
- Others as needed.

Under MPA leadership, this team will work together to research and promote the capability to develop more robust ePTOs that meet the duty cycle required of the fleet owners. If successful, this effort could lead to more widespread adoption of ePTOs vs. Mechanical PTOs, which dominate the fleets currently in use not only at the Port of Baltimore, but at all U.S. ports that handle automobiles and light trucks. These ePTO units would provide the power needed to safely adjust the racks of the carrier chassis to accommodate the loading and/or unloading of passenger vehicles from the car carriers without requiring the heavy-duty diesel engine to idle, which is required to operate the mechanical PTOs.

To give an idea of the scale of potential emissions reductions, in 2022, the Port of Baltimore (state terminals and private terminals) handled 750,163 cars and light trucks. The Port of Baltimore has handled more of that commodity than any other U.S. port for 12 consecutive years. Most of the car carrier trucks servicing the Port of Baltimore idle constantly while loading/unloading vehicles. Most of those trucks have mechanical Power Takeoff (PTO) hydraulic equipment which requires the engine ignition to be running to operate the hydraulic pumps. Typical idling times are two hours. Wider adoption of ePTO units on car carrier trucks has the potential to reduce truck idling time at port facilities. Though some fleet owners servicing the Port do have trucks with ePTOs, it’s uncertain of the exact usage. One fleet owner said experience using ePTOs in the past proved to be unreliable as there were issues operating them in cold weather. Plus, the batteries needed to be replaced every 12 – 14 months. This planning effort is to assess the requirements of the fleet operators and work with industry to design more robust ePTOs to meet those requirements.

C. GEOGRAPHIC AREA AND DESIGNATED NON-ATTAINMENT AREA DESCRIPTION

The Port of Baltimore has multiple terminals, including Seagirt Marine Terminal, Dundalk Marine Terminal, North and South Locust Point and Fairfield/Masonville Marine Terminal. Dundalk Marine Terminal is located in both Baltimore City and Baltimore County. The other terminals are located in Baltimore City. The two main terminals that service automobile and light vehicles cargos are the Dundalk Marine Terminal (identified as G in the map below), and Fairfield/Masonville Terminal (Identified as O & N in the map below).

Baltimore City and Baltimore County are currently in non-attainment of Environmental Protection Agency (EPA) 8-Hour Ozone standards, with both jurisdictions considered to be in moderate non-attainment. A portion of Baltimore County is also in non-attainment of sulfur dioxide standards. <https://www3.epa.gov/airquality/greenbook/ancl.html>

Figure 1 - Map of the project's location



Connections to existing intermodal transportation infrastructure – See above

D. ISSUES AND CHALLENGES

1. Deployment of ZEV Street Sweeper

Deployment of the zero-emission street sweeper is not expected to encounter significant issues or challenges. The MPA will use existing staff to install the charging station, at MPA expense, for the street sweeper and a competitively advertised contract is available to procure the street sweeper. MPA has a robust training and safety program to train the operators and ensure safety of operations on the terminals and on the road.

2. ePTO Planning Initiative

The planning initiative for adoption of ePTOs by car carriers faces more challenges. Heavy-duty trucking electrification is a nascent sector. Class 8 vehicle electrification to date has primarily focused on yard trucks, drayage, and early road truck options. MPA has initiated conversations with car carriers and PTO retrofit companies to better understand some of the barriers to

implementing this technology. Information obtained from outreach to car carriers and PTO retrofit companies finds that there are a limited number of ePTO models available and even fewer on the road presently. To date, the electrification sector has not moved towards specific models or sectors of the transportation industry. Port electrification as a path to carbon reduction is growing, and this fast-paced evolution provides more opportunities for an increasing number of models to be electrified.

The electrification of transportation around ports aligns with the diversity of individual ports, as no two are identical. This presents an opportunity to develop port-specific solutions that can be expanded on a national scale. The Port of Baltimore has been the #1 port in the country in the cars and light truck category for each of the past 12 years. The car carrier fleets servicing the Port of Baltimore are numerous. Electrifying a portion of the car carrier sector, where trucks idle for an average of two-hours to load / unload vehicles, has the potential to significantly reduce vehicle idling. Additionally, ports across the US receive vehicles and see idling car carriers within their ports and airsheds.

This initiative has the potential to promote broader adoption of PTO electrification in the car carrier fleet. As the transportation industry, including car carrier services, continues to grow, the electrification of PTOs will play an increasingly significant role in reducing emissions. The positive impact on emission reductions is expected to be substantial as this eco-friendly approach gains momentum in the sector.

This is an opportunity to expand into new transportation sectors for electrification. PTOs at the Port of Baltimore are primarily fuel-powered in 2023, as historically the capacity didn't exist to meet a duty cycle. Battery technology is closer than ever to meeting existing PTO duty cycle requirements. The manufacturing industry has the capabilities to design and develop and manufacture ePTOs to meet industry needs. There are carriers across the industry interested in being leaders in electrification. The challenge is that industry and manufacturing both need support to move forward. We are at an impasse, as manufacturers are slow to develop ePTOs because there is limited demand, mainly due to lack of data and knowledge of available ePTO options.

Manufacturing and industry require an opportunity to work together to guide and drive car PTO electrification.

This is a proposal for a planning and demonstration phase by the MPA, through use of these grant funds, to sponsor the industry development of ePTOs. The project will occur in and around the Port of Baltimore given its position as the #1 automobile / light vehicle port in the U.S. and the number of fleet owners whose trucks service those vehicles on the landside. This opportunity would bring together the fleet owners to share their industry knowledge and operational requirements with OEMs, car carrier manufacturers, and modifiers to work on a solution for the trucks prior to ownership. A forum would be created where industry insight would help guide and lead manufacturer design. Manufacturers will have greater certainty of industry demand and gain confidence to pursue port related carbon reduction opportunities. They will gain a strong understanding of industry requirements. The companies who provide industry insight into design development will participate in demonstration projects where they could gain experience with

the vehicles.

E. HOW PROJECT ADDRESSES ADMINISTRATION GOALS

1. Safety:

- a. Deployment Project** - The zero-emission street sweeper selected for purchase will meet all on-road transportation safety requirements. Staff will receive training on operator safety and maintenance in order to maximize vehicle performance and carbon reductions. Effective maintenance training will also ensure greater vehicle performance and increased lifespan to maximize efficiency, carbon reduction and cost return on investment.
- b. Planning Project** - The planning goal to design and promote wider adoption of ePTO units on car carrier trucks would reduce truck idling while vehicles are loaded/unloaded, thus reducing emissions, resulting in better air quality and a safer environment for workers and for the local communities around the port. The design and implementation focus group will incorporate safety in the planning process to ensure that utilization of the ePTO is safe for the truck operator and others.

2. Climate Change and Sustainability:

- a. Maryland has set the most aggressive GHG emissions reduction goals in the nation.**

Under the Climate Solutions Now Act (CSNA) of 2022, a target has been established at 60% (over the 2006 level) by 2031 and net-zero emissions by 2045. The replacement of diesel-powered machinery with electric-powered alternatives stands as a paramount pillar of the proposed project, driven by the primary goal of furthering air quality improvement and promoting public health for populations within the project area. By acknowledging and fully comprehending the impact of its operations on the air quality of neighboring communities, the MPA remains committed to actively addressing this concern.

Deployment of a zero-emission street sweeper will reduce greenhouse gas emissions at the terminals, and on the roads connecting the terminals, and in the nearby disadvantaged communities. The current diesel truck uses 250 gallons of fuel a year and travels 531 miles per year. The annual idling hours are 78. The vehicle has 3 years of useful life remaining. According to the EPA [Diesel Emissions Quantifier \(DEQ\)](#), the emissions reductions due to replacement of the diesel street sweeper with a zero-emission vehicle would equal .015 short tons of NOx, .006 short tons of CO and 8.4 tons of CO2.

By embracing the transition to electric-powered machinery and actively planning for further transitions, particularly by abating the impact of idling by car carrier fleets, we not only achieve substantial reductions in harmful emissions, but also establish a solid groundwork for a cleaner and healthier environment. Due to fact that the Port of Baltimore is proudly the largest port of private vehicle entry in the country, the proposed project holds immense potential to make

significant contributions to greenhouse gas emission reductions. Each month, thousands of vehicles pass through our port, presenting a significant opportunity for emission reductions and quality of life improvements for the surrounding communities.

- b. Our proposed project will avoid adverse environmental impacts to air or water quality, wetlands, and endangered species, as well as address disproportionate negative impacts of climate change and pollution on disadvantaged communities.**

According to the USDOT's Equitable Transportation Community Explorer tool (USDOT ETC Explorer), the neighborhoods near the project sites exhibit elevated levels of Climate Disaster Risk and Environmental Burden, as well as heightened Health and Social Vulnerability when compared to the national average. Specifically, the communities adjacent to the Dundalk Marine Terminal and the North and South Locust Point Marine Terminals demonstrate an overall nationwide disadvantage component score for Environmental Burden and Health Vulnerability at the 98th and 92nd percentile, respectively. Additionally, the levels of ozone and diesel particulate matter in these areas are 84 and 88 percent higher, respectively, than the levels found across the rest of the country. The prevalence of asthma and high blood pressure are also elevated, with percentile values of 96th and 89th nationwide, respectively.

A similar situation is experienced by the communities located adjacent to the Masonville Marine Terminal and Fairfield Automobile Terminals, where the overall nationwide disadvantage component score for Environmental Burden is at the 98th percentile, with levels of ozone and diesel particulate matter at the 84th and 88th percentile, respectively.

The transition from diesel-powered heavy-duty vehicles to electric-powered counterparts also directly contributes to water quality improvements through key mechanisms: a) electric-powered heavy-duty vehicles do not emit tailpipe pollutants such as nitrogen oxides (NOx) and diesel particulate matter, which can be carried by rainfall and runoff into the Patapsco River and Chesapeake Bay; and, b) as electric vehicles do not require traditional internal combustion engines, there is no need for oil changes or disposal of used oil, which reduces the risk of oil leakage that could harm water quality and the health of marine life.

Overall, the transition to electric-powered heavy-duty vehicles has a multifaceted positive impact; it promotes public health, enhances the quality of life in neighboring communities, and safeguards air and water quality as well as habitat and ecosystems. By minimizing the risks of fuel and oil spills, reducing pollutant emissions, and prioritizing public health, this transition contributes to a sustainable and healthier environment for everyone involved. Additionally, there are no negative impacts to water quality, wetlands or endangered species from deployment of the zero-emission street sweeper.

3. Equity and Justice 40:

- a. The proposed project benefits will connect Americans to good-paying jobs, fight climate change, and/or improve access to resources and quality of life.**

Electric-powered machinery produces zero direct emissions, contributing to a substantial improvement in air quality and a reduction in harmful pollutants such as ozone and diesel particulate matter, which impact the area according to the USDOT ETC Explorer, as shown in Table 3. Consequently, this transition will lead to tangible health benefits, including reduced rates of respiratory illnesses and improved overall well-being for individuals residing near the project area.

Moreover, the identification of burden categories through the Climate and Economic Justice Screening Tool (CEJST) highlights the critical impact of pollution and low air quality on the health of communities adjacent to the project sites. To address these disparities and enhance the overall welfare of the affected population, targeted interventions focused on greenhouse gas emission reductions are critical.

The need for air quality interventions and improvements are also made clear by the U.S. Environmental Protection Agency’s Environmental Justice Screening and Mapping Tool (EPA EJScreen). According to the EPA EJScreen, the areas within and around the Masonville Marine Terminal, Fairfield Automobile Terminals, and the ones located adjacent to the North and South Locust Point Marine Terminals, are exposed to high levels of ozone and diesel particulate matter, being at the 96th and 83rd percentile nationwide, respectively. The same is true for areas adjacent to the Dundalk Marine Terminal and the North and South Locust Point Marine Terminals, that experience ozone and diesel particulate matter at the 96th and 68th percentile in the USA, respectively.

Beyond the health and quality of life benefits, the proposed shift to electric-powered alternatives aligns with the broader sustainability goals of the MPA and the community at large. By actively pursuing cleaner energy sources, we demonstrate our commitment to combatting climate change and achieving a greener, more sustainable future. This initiative not only serves as a testament to our dedication to environmental stewardship but also encourages the adoption of similar eco-friendly practices within the industry, setting a positive example for other ports to follow.

b. Community Profile and Equity Assessment.

Our proposed project will create proportional impacts and remove transportation related disparities to all populations in a project area, and the project outcomes target at least 40 percent of benefits towards low-income communities, disadvantaged communities, communities underserved by affordable transportation, or overburdened communities.

The CEJST categorizes a significant portion of the areas surrounding the Dundalk Marine Terminal, the Masonville Marine Terminal and Fairfield Automobile Terminals as disadvantaged. Although the North and South Locust Point Marine Terminals do not directly adjoin Census tracts classified as disadvantaged, their location on a peninsula positions them near communities across the upper and lower branches of the Patapsco River in Baltimore City, which are identified as disadvantaged according to CEJST, as displayed in Figure 2.

Additionally, the CEJST identifies several burden categories that significantly impact both the project site and adjacent communities, including health-related burdens such as high rates of asthma, heart disease, and low life expectancy, as displayed in Table 3. These challenges are

further exacerbated by low air quality in the area and underscore the pressing need for targeted interventions towards greenhouse gas emission reductions to address these health disparities and improve the overall well-being of the affected populations.

Regarding demographics, according to the EPA EJScreen, the communities surrounding the Masonville Marine Terminal and Fairfield Automobile Terminals are composed by 69 percent of people of color, with an 11 percent unemployment rate, and where 57 percent of the households are classified as low income, and 28 percent of the population has less than high school education. The population also experiences a very low average life expectancy of 42 years. The communities that surround the Dundalk Marine Terminal are composed by 51 percent of people of color with a 9 percent unemployment rate, where 51 percent of the households are classified as low income, and 24 percent of the population has less than high school education. The average life expectancy for this area is also very low at 54 years.

Table 3: Overall assessment of the project area, per marine terminal, according CEJST and USDOT ETC Explorer

Project Site	Neighboring Census tracts identified as Disadvantaged according to CEJST and USDOT ETC Explorer	CEJST Burden categories	USDOT ETC Explorer Burden Categories
Dundalk Marine Terminal	24510260605 24005421000 24005420702 24510260501 24510260700 24005421300	<ul style="list-style-type: none"> • Climate Change • Health • Housing • Legacy Pollution • Transportation • Water and Wastewater • Workforce Development 	<ul style="list-style-type: none"> • Climate and Disaster Risk Burden • Environmental Burden • Health Vulnerability • Social Vulnerability
North and South Locust Point Marine Terminals	24510260605 24510250207 24510250203 24510250401 24510250500	<ul style="list-style-type: none"> • Energy • Health • Housing • Legacy Pollution • Transportation • Water and Wastewater • Workforce Development 	<ul style="list-style-type: none"> • Climate and Disaster Risk Burden • Environmental Burden • Health Vulnerability • Social Vulnerability • Transportation Insecurity
Masonville Marine Terminal and Fairfield Automobile Terminals	24510250203 24510250207 24510250204 24510250401 24510250402 24510250500	<ul style="list-style-type: none"> • Energy • Health • Housing • Legacy Pollution • Transportation • Water and Wastewater • Workforce Development 	<ul style="list-style-type: none"> • Climate and Disaster Risk Burden • Environmental Burden • Health Vulnerability • Social Vulnerability

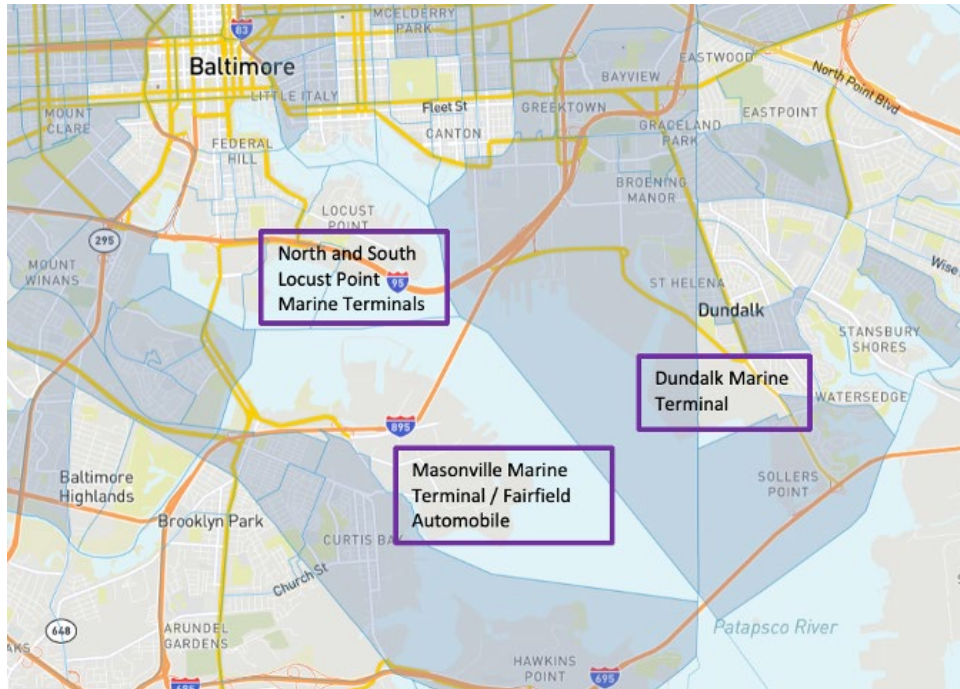


Figure 2: Marine terminal locations and Census tracts identified as *disadvantaged* by CEJST

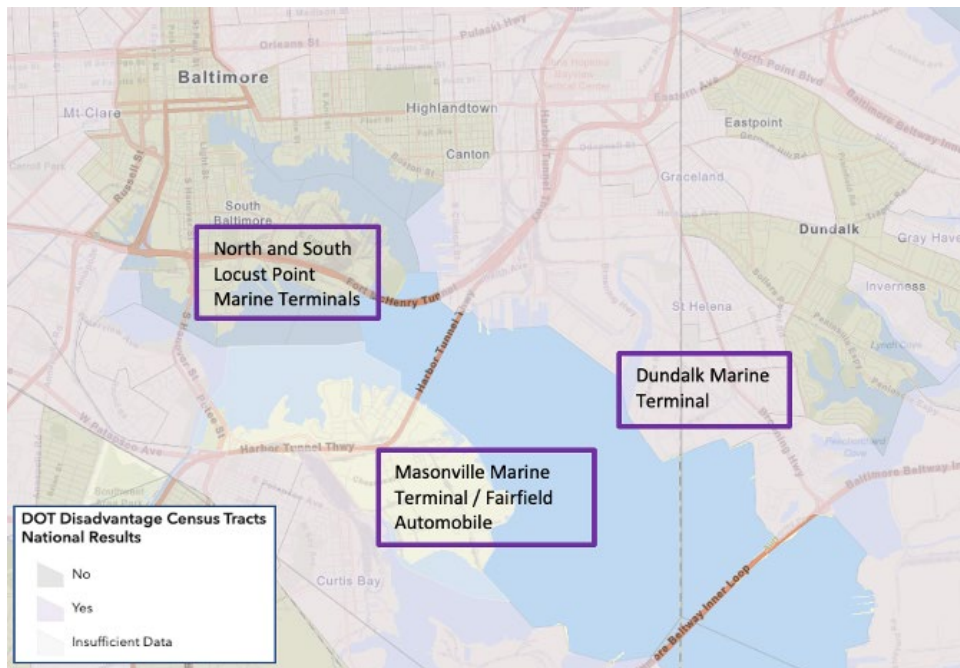


Figure 3: Marine terminal locations and Census tracts identified as *disadvantaged* by the USDOT ETC Explorer

Also, the Centers for Disease Control and Prevention’s Environmental Justice Index Explorer (CDC EJI Explorer), which ranks the cumulative impacts of environmental injustice on health of communities across the nation, further confirms the Environmental Justice status of most communities that neighbor port facilities in the Baltimore region, as displayed in Figure 3. More

specifically, the overall EJI ranking of the target Census tracts ranges from 0.77 to 1, with the Environmental Burden Rank ranging from 0.85 to 1. The CDC EJI Explorer also reports a High Estimated Prevalence of Asthma and Blood Pressure amongst the community, which are directly correlated with poor air quality.

By addressing the root causes of these disparities, such as reducing air pollutants and greenhouse gas emissions, we can work towards creating a more equitable and sustainable future. The identification of burden categories through the CEJST highlights the critical impact of health-related challenges, aggravated by low air quality, on the project site and adjacent communities. To address these disparities and enhance the overall health of the affected populations, targeted interventions focused on greenhouse gas emission reductions are critically important. By doing so, we not only address immediate health concerns, but also foster a more sustainable and equitable future for everyone involved.

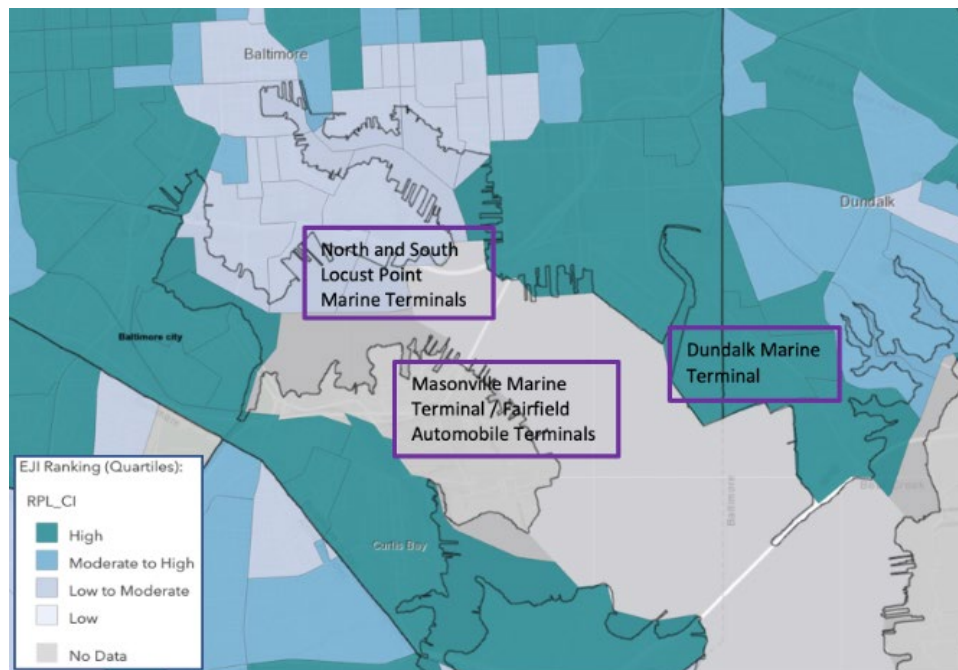


Figure 4: Marine terminal locations and Census tracts' Environmental Justice Index ranking (CDC EJI Explorer)

c. How meaningfully public engagement will occur throughout the proposed Project's life cycle.

Our objective is to continue to actively engage the populations within the project area, with a special emphasis on minority, low-income and disadvantaged, and overburdened communities throughout the project's life cycle. By involving these communities, we aim to incorporate their perspectives, address their unique challenges, and ensure that the MPA's transition to zero-emissions machinery aligns with their needs. To do so, we will continue to pursue partnerships with local organizations, including the St. Helena Community Association, Dundalk Renaissance Corporation, and the Baltimore Climate Resilience Coalition, and further engage with community leaders and advocacy groups that have a strong presence and influence in the

communities that neighbor our terminals. The collaboration with local partners provides us with insights into community dynamics, builds trust in the project, and facilitates public input.

We will also continue to leverage the wide reach of our [Advisory Committees](#) that act in the project region, including the Citizens Advisory Committee, Cox Creek Citizens Oversight Committee, Harbor Team, Innovative Reuse Committee, and the Masonville Citizens Advisory Committee. By using existing and successful platforms to amplify our public engagement and outreach, we ensure that the residents, who will experience the air quality improvements provided by the project, have a voice in the decision-making process.

Furthermore, we will invest in digital outreach, utilizing existing community platforms, social media groups, and newsletters, including the Port of Baltimore’s EcoPort newsletter. The project team will use the selected outlets to advertise community meetings and will arrange interviews with project representatives and community leaders to raise awareness, address misconceptions, and promote community engagement. We understand the importance of listening to community members' concerns, communicating regularly project progress to the community, and to promptly responding to community feedback. For that reason, we plan to cultivate a continuous feedback loop regarding public outreach and engagement throughout the entire project life cycle.

4. Workforce Development, Job Quality, and Wealth Creation.

Applicants must address how their project will create good-paying jobs with free and fair choice to join a union; and change hiring policies and workplace cultures to promote the entry and retention of underrepresented populations. Applicants should address how the project promotes local inclusive economic development and entrepreneurship such as the utilization of Disadvantaged Business Enterprises.

As a contractor to the Maryland Environmental Service, for any Task Order issued to EcoLogix Group, the contractor shall structure its procedures for the performance of the work required in this scope to achieve a minimum of 29.00% overall minority business enterprise (MBE) goal of the total contract price, which shall be achieved in non-contingent work subtasks.

F. TRANSPORTATION SYSTEMS AND SERVICES INCLUDED IN WORK

Transportation systems and services are not included in this project.

G. DETAILED STATEMENT OF WORK

1. Deployment Project - The Maryland Port Administration (MPA) will procure the zero-emission street sweeper and install the electric vehicle charging station on Port property for the deployment project. MPA’s Fleet Maintenance staff will be responsible for the proper installation and maintenance of the charging station.
2. Planning Project - MPA will oversee and guide the work of the Maryland Environmental Service (MES) and its subcontractor EcoLogix Group, Inc.

This is a proposal for a planning phase for the MPA, through use of grant funds, to sponsor the industry development of ePTOs. The project will occur in and around the Port of Baltimore given its position as the #1 automobile / light vehicle port in the U.S. and the number of fleet owners whose trucks service those vehicles on the landside. The development and deployment of ePTOs at the Port of Baltimore will have the greatest impact on air-quality improvement of a port nationally. Now is the time to focus on ePTOs as the technology is available to meet the duty cycle requirements for both charging and battery. This opportunity would bring together the fleet owners to share their industry knowledge and operational requirements with OEMs, car carrier manufacturers, and modifiers to work on a solution for the trucks prior to ownership. A forum would be created where industry insight would help guide and lead manufacturer design. Manufacturers will have greater certainty of industry demand and gain confidence to pursue port related carbon reduction opportunities. They will gain a strong understanding of industry requirements. The companies who provide industry insight into design development will help guide industry development of their future fleets nationally while gaining confidence in the technology to meet their duty-cycle requirements. This planning project will provide an opportunity for all actors involved across industry to gain confidence that electrification can be successful as has been done in other sectors of the transportation industry.

To give an idea of the scale of potential emissions reductions, in 2022, the Port of Baltimore (state terminals and private terminals) handled 750,163 cars and light trucks. The Port of Baltimore has handled more of that commodity than any other U.S. port for 12 consecutive years. Most of the car carrier trucks servicing the Port of Baltimore idle while loading/unloading vehicles. Most of those trucks have mechanical Power Takeoff (PTO) devices which requires the engine ignition to be running to operate the hydraulic pumps. Typical idling times are two hours. Some fleet owners servicing the Port have advised that some of their trucks do have ePTOs which do not require the truck engine to idle to run the hydraulic pumps, but it's uncertain of the exact usage. One fleet owner whose past experience using ePTOs proved to be unreliable, said there were issues operating the ePTOs in cold weather. Plus, the batteries needed to be replaced every 12 – 14 months. This planning effort is to assess the needs of the fleet operator and to design more robust ePTOs to meet those needs.

Industry involvement in ePTO design will engage car carrier operational requirements into product design-phase. This early involvement by car carriers will allow them to gain confidence in the nascent current generation ePTO design to meet industry duty cycle requirements. The car carriers engaged in the planning program will have confidence to place early purchase orders. Thereby developing early demand for this generation of ePTOs as an emerging technology. This is an underserved sector of the transportation industry which has not focused on electrification. The ambition to reduce idling is a tangible solution towards air quality improvement in underserved and vulnerable communities.

The car carrier fleets servicing the Port of Baltimore are numerous. To electrify a portion of the car carrier sector has the potential to reduce vehicle idling by a significant number of hours. This initiative has the potential to support wider adoption of PTO electrification in the car carrier fleet nationally. Like all areas of the transportation industry, car carrier services continue to grow, and the electrification of PTOs will have an increasing impactful potential on emission reductions.

The planning goal of replacement of the current mechanical PTO units for electric PTO units will be to reduce truck idling while vehicles are loaded/unloaded to/from the car carrier trucks, thus reducing emissions, resulting in better air quality and a safer environment for workers and for the local communities around the port. The design and implementation focus group will incorporate safety in the planning process to ensure that utilization of the ePTO is safe for the truck operator and others.

By embracing the transition to electric-powered machinery and actively planning for further transitions, particularly by abating the impact of idling by car carrier fleets, we not only achieve substantial reductions in harmful emissions, but also establish a solid groundwork for a cleaner and healthier environment. Each month, thousands of vehicles pass through the port, presenting a significant opportunity for emission reductions and quality of life improvements for the surrounding communities.

The planning project will include the below specific elements.

a. Outreach

Outreach will be conducted to the planned participants in the ePTO development team. These planned participants will include (but not limited to):

- Car carrier fleet owners, including those who have expressed interest in ePTOs; United Road,
- Manufacturers of car carrier trucks and ePTOs, Cottrell;
- Retrofitters who can install ePTOs; Fontaine Modification;
- Car hauler manufacturers;
- Port staff;
- Consulting staff with experience in electric fleet operations; and
- Others as needed.

b. Survey

A survey will be developed and distributed to the car carrier fleets calling the port to gather data to develop understanding of the fleet profiles, including information on truck types, year of manufacturer, engine hours, engine miles, engine types, projected vehicle lifespan, number of port visits, current PTO configurations, etc. The ambition of the survey is to understand duty cycle requirement and future industry need to meet new technology across the industry to limit impact to truck loading/unloading operations.

c. Data Collection, Analysis, and Distribution

Data gathered from the survey will be compiled and shared with industry through a series of meetings which will be held to determine the capabilities and requirements of ePTOs, energy needs, infrastructure needs, costs, maintenance, etc.

d. Deliverables

- A report will be prepared outlining the findings of the survey and feedback from across industry. Knowledge sharing is the outcome of this planning project. The information is to be used in the development of ePTO prototype.
- A series of recommendations for the development of an ePTO will be shared at the end of the planning phase to promote the development of prototype ePTO units.

H. DEPLOYMENT PLAN

The MPA will install and maintain the EV charging station, at MPA expense, for the new zero emission street sweeper and will operate and maintain the street sweeper after purchase. MPA Fleet Maintenance staff will install the charging station and MPA Operations staff will operate the vehicle over the road and at multiple state-owned facilities.

I: CHALLENGES OR OBSTACLES TO DEVELOPMENT

A description of any challenges in the regulatory, legislative, or institutional environments or other obstacles to deployment. This should include, as applicable:

1. ZEV street sweeper. The ZEV Street sweeper and charging station that will be purchased comply with the Buy America Act. The ZEV street sweeper is made in the USA by Global Environmental Products. Information on the company and the equipment can be found using this link <https://globalsweeper.com/about-us/about-global-environmental-products>. The street sweeper will comply with FMVSS and FMCSR. An exemption is not required.

NEPA requirements are not applicable to this project as there will be no NEPA impacts from either deployment of the ZEV street sweeper or the planning exercise.

J. DATA COLLECTION PLAN

1. Deployment of Street Sweeper

Zero emission vehicles (ZEVs) collect a variety of data that can be used to improve the design, performance, and infrastructure of these vehicles. Some of the most common data collected from ZEVs include:

- Vehicle performance data: This data includes information on the vehicle's speed, acceleration, braking, and energy consumption. This data can be used to optimize the vehicle's powertrain and battery, and to improve the vehicle's range and efficiency.
- Driving behavior data: This data includes information on the driver's speed, acceleration, braking, and use of the climate control system. This data can be used to understand how ZEVs are being used in the real world, and to identify opportunities to improve the driver's experience.
- Vehicle location data: This data includes information on the vehicle's location, speed, and direction of travel. This data can be used to track the movement of ZEVs, and to identify areas where charging infrastructure is needed.
- Battery health data: This data includes information on the battery's state of charge, health, and temperature. This data can be used to monitor the battery's performance, and to identify potential problems early on.

The collection of data from ZEVs is an important part of the transition to a clean transportation future. This data can be used to improve the design, performance, and infrastructure of ZEVs, and to make it easier for people to choose these vehicles. As the number of ZEVs on the road

continues to grow, the amount of data collected will also grow, providing even more insights into how these vehicles can be used to improve our transportation system.

For the street sweeper, MPA also collects data on the volume of debris collected. The Maryland Department of the Environment (MDE) Municipal Separate Storm Sewer System (MS4) Permit requires that twenty percent of untreated baseline impervious area must be treated by the MS4 permittee by 2025. Impervious area treatment may be met via several options, one of which is with alternative stormwater best management practices, as defined by the MDE.

MPA conducts continuous alternative BMP pollutant reducing operations including mechanical street sweeping throughout the terminals. MPA sweeps the main streets, berths, and parking lots, which are high traffic areas and have a greater potential to collect more sediment. MPA also notes any areas that have excess sediment during their MS4 inspections. If an area is noted with excess sediment, a maintenance work order is submitted for that location to be swept.

This material is tracked by weight and is assigned an impervious treatment credit in acres that is then applied to the twenty percent treatment permit requirement. In the current permit term (2019-present), MPA has captured about 40.85 tons of debris. This equates to a permit term average of 9.24 impervious treatment acre credits.

2. ePTO Planning Project

For the planning project, data will be collected on the number and type of car carrier fleet trucks calling the Port of Baltimore through a survey distributed to the current car carrier fleets. This data will include the engine model year of the current trucks servicing the port, the number of trips to the port, and the length of time spent idling at the port to load/unload vehicles.

K. HOW PROJECT MEETS MERIT SELECTION CRITERIA

A description of how the application meets the merit selection criteria in section E.1 of this NOFO.

MPA believes this project meets 4 of the 5 Grant Program goals:

- Promoting development of port-related infrastructure that reduces emissions from port-related truck idling, including the electrification of port operations;
- Promoting development of on-truck technologies that reduces emissions from port-related truck idling;
- Promoting use of zero or low emissions powertrains or fuels on trucks and;
- Other improvements that reduce port-related emissions from idling trucks, including through the advancement of port electrification and improvements in efficiency, focusing on port operations, including heavy-duty commercial vehicles, and other related projects.

MPA also believes this project meets the 4 Administration goals:

- Safety
- Climate Change and Sustainability
- Equity and Justice 40
- Workforce Development, Job Quality, and Wealth Creation

The existing diesel-powered electric street sweeper will be replaced by a zero-emission battery electric-powered unit, thus reducing diesel emissions immediately upon being deployed. This is an improvement that will reduce port-related emissions from idling trucks, including through the advancement of port electrification and improvements in efficiency focusing on port operations. An electric vehicle charging station will be installed at the Port, which will promote development of port-related infrastructure that reduces emissions from port-related truck idling.

The planning task looks to bring together multiple industry stakeholders to determine the operational duty cycle of car carrier truck fleet owners that pickup and deliver passenger vehicles at the Port of Baltimore. Most fleet owners use trucks with mechanical Power Take Off (PTO) devices to adjust the racks on the trucks to accommodate the vehicles being transported. This process takes about two hours to complete with the truck idling the entire time. The goal is to work with industry to develop more robust electric Power Take Off (ePTO) devices to adjust the racks so the truck would not need to idle. To give an idea of the scale of potential emissions reductions, in 2022, the Port of Baltimore (state terminals and private terminals) handled 750,163 cars and light trucks. The Port of Baltimore has handled more of that commodity than any other U.S. port for 12 consecutive years. With those volumes moving through the Port on an annual basis, proving that an ePTO has sufficient power may convince more fleet owners to adopt this technology. Such technological development could also benefit other ports as several car carrier fleets operate nationally. This effort will promote the development of on-truck technologies that reduce emissions from port-related truck idling. It will also promote the use of zero or low emissions power trains or fuels on trucks.

L. PORT'S VISION, GOALS AND OBJECTIVES TO REDUCING TRUCK EMISSIONS AT PORTS

Since the MPA's Diesel Equipment Upgrade Program <http://www.dieselupgrades.org/> was launched in 2008, the Port has leveraged over \$20 million in grant funding for upgrading and purchasing equipment and vehicles that have reduced emissions from port-related activities. This includes the replacement of 293 drayage trucks to date. Additional funding from Maryland's VW Mitigation Plan will ensure continuation of the Port's Dray Truck Replacement Program. That funding is expected to replace approximately 43 older diesel-powered drayage trucks with newer models over the next two years. Heading into 2024, vehicle, vessel and equipment electrification is a priority. Electrification will aid in reducing greenhouse gas emissions and enhance sustainability.