



AAPA ENVIRONMENTAL IMPROVEMENT AWARDS

CATEGORY: COMPREHENSIVE ENVIRONMENTAL MANAGEMENT

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Port of Stockton MD/HD Electrification Project Summary

The Port of Stockton (Port) is located in the City of Stockton, California, in San Joaquin County, approximately 75 miles east of San Francisco and 40 miles southeast of Sacramento. This unique inland seaport is situated on the delta of the San Joaquin River within a fertile agriculturally rich community. It is also California's fourth busiest port, an anchor of the Stockton community and California's Central Valley and provides more than 10,000 jobs. The Port's diverse tenant base encompasses 132 businesses, including renewable fuel producers, cement manufacturers, rice and agricultural exporters, and break-bulk and specialty cargo imports and exports.

While the Port is a vital economic engine, the trucks, ships, equipment, harbor craft, and locomotives that support this economic activity generate air pollution and negative health impacts on the nearby community.

Aiming to put people first, the Port has launched an ambitious effort to one day eliminate Port-related emissions entirely and, in the meantime, significantly reduce impacts on its neighbors. This MD/HD Electrification Blueprint (Blueprint), developed in partnership with the community, industry, and government agencies, sets forth the strategies necessary to make that transformation happen.

The MD/HD Electrification Project (Project) started with the Port's ongoing zero-emission vehicle (ZEV) deployments in order to support larger-scale public and private adoption of medium- and heavy-duty (MD/HD) ZEVs. Thoughtful development of ZEV refueling infrastructure can support future development of microgrids, industrial hydrogen utilization, electrification of industrial processes, and combined heat and power systems at the

Port. The Port has recently begun demonstration of one of North America's first battery-electric locomotive railcar movers, a major technical leap in MD/HD ZEV adoption. With these ongoing, early-adopter demonstrations, the Port will gain valuable insights into the planning, design, construction, and operation of MD/HD ZEV charging and refueling infrastructure.

Through a \$200,000 grant from the California Energy Commission (CEC) and a partnership with the cleantech transformation company Momentum, the Port has drafted this Blueprint to outline a feasible, readily deployable, and replicable roadmap enabling the rapid transition to MD/HD electric vehicles and cargo-handling equipment.

"In the past, we've been somewhat reactive to grant opportunities, instead of taking a step back and looking at the bigger picture. This Blueprint is an opportunity to chart an intentional and strategic course of action into a zero-emission future."

—Jeff Wingfield, Deputy Port Director, Regulatory and Public Affairs

Goals and Objectives

The primary goal of the Project is to reduce air quality impacts from Port and tenant activities. The adoption of ZEVs will also provide economic benefits and opportunities at the Port and beyond.

Reducing Air Quality Impacts

Shipping and trucking activities emit thousands of tons of greenhouse gases (GHGs) and criterial pollutants, the former being a global warming pollutant and the latter affecting local air quality. The ongoing deployment of ZEVs will eliminate tailpipe emissions at the Port and along the Port's transportation corridors, which are a significant source of climate pollutants such as particulate matter. Electric and hydrogen fuels have significantly lower carbon intensities than fossil fuels. The transition to ZEVs will result in GHG emission reductions, resulting in substantial environmental and health benefits.

Economic Benefits and Opportunities

The adoption of ZEVs will create business and employment opportunities locally through the installation, operation, and maintenance of refueling infrastructure and equipment and the sale of ZEVs. The Port received grant funding for a workforce development program with on-the-job training and curriculum being developed at local school districts and community colleges near the Port. This will help create job readiness and career opportunities in the electric vehicle and equipment industry for local residents. The Project will also help to increase state revenue through the ZEV sales tax. Since electricity and hydrogen can be produced in-state, additional state revenues are expected to be associated with new manufacturing. By displacing the need to purchase petroleum fuels, it will also help to reduce the dependence on foreign fuels.

Objectives of the Blueprint

The Blueprint is a cornerstone of the Project, and it seeks to address barriers to electric vehicle adoption relevant to the Port's fleet and utility infrastructure, its tenants, industry partners, and the Port's own business model. Specifically, it addresses issues such as range anxiety, charging duration and operational constraints, impacts to local grid infrastructure, and how localized beachhead



Engaging with Stakeholders

The Port presented an overview of the Blueprint to stakeholders at a recent Port Outreach Committee meeting.



electrification projects can spur community and industry adoption of zero-emission and renewable energy technologies. It is also a chance to assess the current regulatory landscape related to air emissions and electric vehicle adoption.

Background

The Port, along with its tenants and stakeholders, recognizes the environmental impacts of its operations. The neighborhoods surrounding the Port and its major movement and facilities and corridors include communities identified by the California Environmental Protection Agency and Assembly Bill (AB) 617 as disadvantaged communities due to socioeconomic characteristics and environmental burden. The Port is a lead stakeholder in the Stockton AB 617 Air Protection Program and engages directly with local communities through its Port Outreach Committee (POC). Air quality impacts, GHG emissions, and associated health impacts are key concerns for local residents and stakeholders.

The Project is an important part of the Port's ongoing sustainability initiatives and commitments. The Port is uniquely positioned to accelerate the adoption of ZEVs, equipment technologies, and distributed energy resource systems due to its position as a landlord port, an operating port, a stevedoring provider, and a municipal electrical utility operator. The Port's utility jurisdiction over the 1,400-acre Rough and Ready Island (the Port's West Complex) creates additional complexities, costs, and opportunities for unlocking the maximum value of electrification.

Objectives and Methodology

This section summarizes the major components of the Project, all of which are ongoing.

Community Outreach and Stakeholder Engagement

The Port is committed to conducting regular and clear community outreach and stakeholder engagement. The POC is an advisory body dedicated to enhancing the Port's relationship with the local community by creating greater transparency through direct dialogue between Port leadership and staff, stakeholders, community members, and

local and state agencies. During monthly virtual POC meetings, the Port has provided updates on the Project and solicited feedback, and that feedback has been incorporated into the Blueprint and decision-making process.

Other outreach specific to the Project includes regular communication with Port tenants and industry representatives, local jurisdictions, community organizations, Native American Tribes, policymakers and regulatory agencies, financial partners, tech providers, education and workforce development partners, and electricity and hydrogen providers. Major takeaways from these outreach efforts are that:

“Overall, our goal is to reduce impacts to the adjacent communities; this gives us an opportunity to get our vision on paper and develop a plan to implement it.”

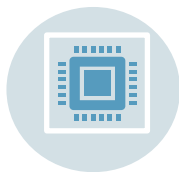
—Jeff Wingfield



The Project is an opportunity to redefine community relationships.



The Project must align with other internal plans and strategic goals.



Innovative business models can help to overcome the cost barriers associated with ZEV deployment.



Education and awareness are important to make the transition process a success.

Early-Adopter Demonstrations and Deployment

In recent years, the Port has begun demonstrating a range of MD/HD zero-emission technologies. With support from the California Air Resources Board, the Port deployed 36 zero-emission forklifts and one of North America's first battery electric locomotive rail car movers. Through ongoing, early-adopter strategies, the Port has gained valuable insight to the planning, design, construction, and operation of electric vehicle charging and refueling infrastructure and identified barriers that need to be addressed to support the widespread adoption of electric freight equipment in a cost-effective and timely manner. The Port has also begun issuing annual emissions inventories to establish the baseline necessary to identify the paths towards electrification.



Port's Battery Electric Rail Car Mover

The Port acquired and began using a battery electric locomotive rail car mover in 2021.

Preliminary ZEV Fleet Selection and Infrastructure Design

The Port has done research to understand the types of shoreside vehicles and equipment that visit and operate at the Port as well as their operational needs. They found that 40% of their fleet is already electric and identified 85 vehicles and 105 pieces of terminal equipment that are well-suited for the transition to zero-emission technology.

Other key findings from this research include:

- The vehicles and equipment needed for Port operations have highly variable duty cycles.
- Many commercialized options for ZEVs are still in development and not yet available for purchase.
- Battery electric technology is expected to be the dominant platform due to the lack of public hydrogen refueling stations and cost effectiveness.
- There are 30 existing charging units at the Port, and it is estimated that an additional 230 new charging units will be needed.



Examples of EV chargers at the Port

The Port provides reliable electric service as a municipal electric utility and is capitalizing on this service by implementing and expanding its EV charging stations.

Development of the Blueprint

A draft of the Blueprint has been completed. The components described previously are included in the Blueprint along with resiliency planning for climate change and natural disasters and a critical pathway analysis. Key conclusions of the Blueprint include:

- The Port should invest in on-site electricity generation and storage as part of resiliency planning and mitigation.
- The transition strategy should use existing assets and be installed in phases.
- The transition strategy should adhere to government mandates and decarbonization targets.
- Workforce development, employment, energy security, and other benefits will further equity goals in the region
- Stakeholder engagement for the Project should be ongoing through implementation of the Blueprint.

Next Steps

The Port will perform an internal review for ZEV prioritization and develop a timeline for Port and tenant fleet transition to be deployed in phases. This timeline will include the installation of infrastructure and a charging plan to maximize efficiency. The Port will also develop an operations and maintenance plan for the new vehicles, equipment, and infrastructure.

Beyond the deployment of ZEVs, the Port will also apply for all applicable funding opportunities, consider the development of distributed energy resources, and seek opportunities to share lessons learned and implementation strategies with industry stakeholders and partners.

Fulfilling Award Criteria

Benefits to Environmental Quality

The impetus for the Project is to improve air quality by reducing climate pollutants and GHG emissions produced by the Port and its tenants. Because of the Central Valley's unique physical characteristics, the pollution potential in the area is very high.

The Port is located within the San Joaquin Valley Air Basin, which has been identified as being in non-attainment with the California Ambient Air Quality Standards for certain criteria air pollutants. Neighborhoods immediately surrounding the Port are often the most impacted by construction and operational emissions. The Project is an

important part of the Port's multifaceted air quality program. Reducing air emissions not only benefits the environment, but also reduces the health burden on local residents.

Port Involvement

While the Port has many partners in this effort, it is a Port project that is being voluntarily undertaken. The Port has taken the initiative to lead all aspects of the Project from securing funding to implementation. It is integrated into other Port-wide environmental, sustainability, and stakeholder engagement initiatives and clearly demonstrates the Port's commitment to being faithful environmental stewards and community leaders. The Port



Improving the Environment

Tree planting is part of the Port's air quality program.

is proud to be certified by [Green Marine](#), the largest voluntary environmental certification program for North America’s maritime industry.

“The Port of Stockton exemplifies the type of forward-thinking and responsible operation that Green Marine recognizes with its certification. We commend them for achieving certification just months after signing up and look forward to playing a role in their continued progress.”

—David Bolduc, Green Marine's Executive Director

Creative Solutions

While a handful of other ports in the United States and around the world have developed electrification plans, there is no one-size-fits-all approach. As the zero-emission industry and the regulatory landscape are still developing, planning for a full transition to zero-emission technologies requires creative and innovative strategies—from finding new sources of funding to building collaborative partnerships. The Port has worked in tandem with other ports to successfully secure grant funding through the California Air Resources Board’s Zero and Near-Zero-Emission Freight Facilities Program, which granted the Port access to the industry’s first commercialized large capacity electric forklift manufactured exclusively in the United States.



EV Forklift at Port

The Port has 36 EV forklifts in use and will be expanding its fleet.

The Port has also demonstrated creativity through its outreach strategies, going above and beyond to ensure that all stakeholders are included in the planning process. Outreach efforts have included presentations at the Port’s monthly POC calls and summary information in regular newsletters to tenants to provide updates about the Project.

Project Results to Date

Early deployment of innovative ZEVs and equipment was a resounding success and helped build momentum for the Project. To date, the Port has secured additional grant funding, which demonstrates the merits of and support for the Project. The recent completion of the draft Blueprint was another milestone that clearly lays out the path forward for the Port.

Cost Effectiveness

While there are many variables that will affect the total cost of transitioning to ZEVs, the Port estimates the cost to be \$37 to \$40.6 million, with \$29 million borne by the Port, and the rest split among the Port's tenants. While high, this estimate does not take into account the significant savings in operation and maintenance costs compared to conventional vehicles and equipment and other opportunities for funding from state and federal programs such as California's Clean Transportation Program. The Port will continue to take advantage of opportunities for grants and partnerships to ensure that the Project provides long-term economic benefits for all stakeholders.

Transferability to the Port Industry

It is clear that ports around the world will have to adapt and move towards electrification and widespread deployment of zero-emission technologies. The Port is setting an example of environmental stewardship to enhance and the support this transition both locally and globally. The lessons learned from this project will benefit the Port industry as well as related maritime industries and will send a clear market signal that a cohesive and reliable framework for electric infrastructure can be scalable and accessible to all.

CONCLUSION

The Port is already an industry leader in the transition away from fossil fuels towards clean, zero-emission equipment powered by renewable energy, and has set an ambitious goal to get to completely zero emissions in the near future. The end result will be a cleaner, more sustainable Port with ripple effects through supply chains across the Central Valley, which directly benefits the surrounding communities.