Powering Florida: Port Electrification as a Pillar of Global Competitiveness

February 2026

AECOM

Introduction

OBJECTIVE

This assessment report aims to support Florida port authorities, operators, users, and stakeholders with understanding the economic, operational, environmental, health and safety, resiliency, and adaptability benefits of adopting electrification technologies at Florida's seaports.

Ports are pivotal nodes in the global supply chain and play a crucial role as the main gateways facilitating trade and commerce. They are essential to the economies of cities and regions across the U.S. and throughout the world.

The maritime industry globally is experiencing significant market drivers that are accelerating a shift toward electrification in maritime operations that are resulting in numerous benefits including **economic, operational, environmental, health and safety, resiliency, and adaptability**.

Electrification opportunities at seaports typically fall into two categories, as noted below, and which are discussed in this report. However, there are many other opportunities for implementation of electrification strategies, technologies and equipment within ports and marine terminals, such as alternative power solutions.

Terminal equipment in landside operations, including cargo handling equipment *(e.g., rubber-tired gantry cranes, top-handlers, forklifts, terminal tractors)*

Shore power for cruise, cargo and other vessels and waterside operations, allowing connection to the port's electrical grid instead of running auxiliary engines while docked *(also referred to as ship-to- shore power)*

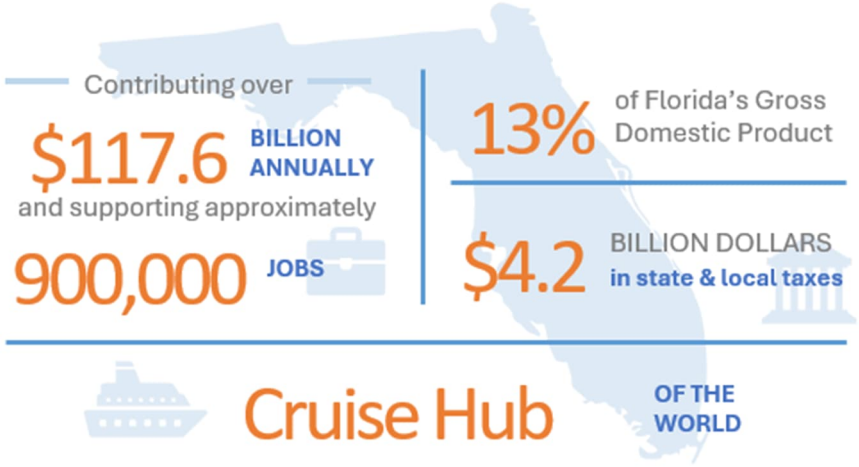
This assessment acknowledges the role of Florida seaports locally, regionally, nationally, and globally, considers the market drivers of port electrification, provides a high-level evaluation of electric terminal equipment options, discusses shore power trends and adoption considerations, and presents opportunities for funding port electrification projects.

Report Contents

The Importance of Florida's Seaports Economy

Cruise Hub of the World in a Changing Global Maritime Landscape

Global maritime trade and tourism are moving toward higher-efficiency, modernized, and lower-emission port operations, and shore power and terminal electrification are increasingly becoming baseline expectations for many cruise and container shipping lines and terminal operators as they pursue corporate sustainability and emissions goals and respond to evolving international frameworks.



Home to the world's three busiest cruise ports, **Florida is known as the cruise hub of the world**. Most of the new mid- to large-size vessels are expected to be in the Florida/Caribbean region during peak cruise season (October through May) and the major global cruise brands that call at Florida ports, particularly at PortMiami, Port Canaveral, and Port Everglades, have about 50% of their vessels currently configured to accommodate shore power. This trend is expected to continue to expand rapidly, with more than 70 new-build cruise vessels expected over the next five years, and most (if not all) expected to have shore power capabilities.

While Florida does not directly compete with every major port worldwide for the same cargo flows and cruise itineraries, leading ports in North America and Europe function as global reference points: their earlier adoption of shore power and electrified terminals is shaping the operational standards vessel operators increasingly expect across their networks. This shift is reinforced by global regulatory momentum, including the International Maritime Organization's emissions-reduction strategy and related carbon-intensity requirements, as well as European Union policies that elevate shore power as a standard practice at major ports.

Maintaining Florida's role as a vital gateway for global trade and the cruise economy over the next 25–50 years will require keeping pace with these industry-wide expectations—not solely to compete port-to-port within Florida or with other ports within the U.S. southeast and along the eastern seaboard, but to remain aligned with how carriers allocate vessels, homeport activity, and service growth across regions. Florida ports have already begun advancing shore power and electrification, including major cruise-berth installations and multi-terminal programs, and several ports are planning

infrastructure now to reduce the cost and disruption of future retrofits. Competitiveness can be strengthened by expanding shore power where vessel demand is highest (particularly for cruise vessels), coordinating early with utilities to secure adequate and reliable power supply, and pairing waterside investments with landside electrification that improves capacity, throughput, safety, and operating cost performance. Together, these actions position electrification as a modernization strategy that supports customer requirements and port growth forecasts, strengthens resilience and operational continuity, and helps Florida remain an attractive, future-ready destination for the newest shore-power-capable cruise ships and the next generation of large container vessels serving key trade lanes.

Port Electrification in Florida

The adoption of port electrification technology has the potential to increase regional economic output and employment, which could include the addition of technical job positions, as well as providing a safer working environment within marine terminals. Florida is well-positioned to lead this transformation in the U.S. Southeast, with 16 public seaports that play a critical role in the state's economy and are experiencing steady growth in both cruise and cargo operations.

Florida seaports are not only evaluating the feasibility of port electrification, but both port authorities and terminal operators are already investing in electrifying terminal equipment and shore power, as well as replacing diesel equipment to hybrid and/or alternative-fueled equipment.

Engaging Stakeholders for a Local Lens

With support from the American Association of Port Authorities (AAPA) and Florida Ports Council (FPC), Florida's public seaports and other key port stakeholders (e.g., cruise/shipping lines, terminal operators, cargo companies, etc.) were engaged using a questionnaire to gather information about current port operations, goals and priorities, motivations driving port electrification, perspectives on market trends, and potential impacts to resiliency and future operations if electrification initiatives are prioritized and implemented. The responses supported this report by incorporating a local lens to port electrification considerations specific to Florida.

Of the ports engaged in Florida, many are already taking actions towards or considering port-wide and/or terminal electrification strategies, and several have studied, are considering, planning, or have implemented shore power. Exhibit 1 below is a summary of the status of terminal equipment electrification and shore power installation adoption and planning at several Florida ports.

Exhibit 1. Port Electrification in Florida – At a Glance

Port	Terminal Equipment	Shore Power Installations
PortMiami	Retrofitting shore-to-ship (STS) cranes from diesel to electric; replacing diesel rubber-tire gantry cranes (RTGs) with electric RTGs	Shore power installation program at 5 cruise berths completed 2024-2025
Port Everglades	Electric STS cranes (13), electric vehicle charging stations (6), and solar power for a cruise terminal have been deployed. Currently coordinating the addition of two hybrid RTGs with charging stations for a cargo terminal.	Procuring engineering design services for shore power at 8 cruise berths. Shore power systems in place for tug operations and at the U.S. Coast Guard Facility
Port of Pensacola	Open to exploring options	Available at Berth #1 and Berth #5
Port Manatee	Electrifying two mobile harbor cranes (MHCs), as funded by INFRA 2022	Not currently applicable
Port Canaveral	Not currently applicable	A feasibility study was conducted for shore power at all 6 existing cruise terminals and berths
Port Tampa Bay	Three electric RTGs deployed	Laying conduit to accommodate future shore power infrastructure when requested
Port Fort Pierce	Not currently applicable	Installed for maintenance, repair, and overhaul (MRO) of vessels

Florida's Largest Shore Power Programs and Studies

Some of the known shore power studies and development programs for large vessels in Florida are highlighted below.

PortMiami. The Port recently implemented a $130 million shore power installation program at five cruise berths. The project was primarily funded by PortMiami, with $18 million from Federal and State grants. The first berth was operational in May 2024, with the rest completed by about mid-2025. The challenge for PortMiami is that power can only be provided to three berths at any one time due to power supply constraints from FPL to PortMiami. Switching equipment was installed to split power at three points: (1) between the Virgin Voyages Cruise Terminal V at Berth V and Carnival Cruise Terminal F at Berth 2; (2) between the Norwegian and Royal Caribbean Cruise Terminals at Berths 6 and 7; and (3) at Mediterranean Shipping Company (MSC) Cruise Terminal for Berth 8 and Berth 9.

Port Everglades. The Port is embarking on a cruise shore power program, with a Feasibility Study completed (in early 2023) for eight cruise terminals (and berths) located in the Northport (two berths) and Midport (six berths) regions of the Port. The Port is currently in the process of procuring engineering design services to advance this program. As part of the Port's Master/Vision Plan 2024 Update, shore power installations for the container berths in the Southport region of the Port are also being considered. The port currently has shore power systems for tug operations and the U.S. Coast Guard Fort Lauderdale Station located within the Port jurisdictional area also has active shore power systems.

Port Canaveral. Royal Caribbean Cruise Line conducted a port-wide feasibility study and included concepts to provide shore power at all six existing cruise terminals and berths, with consideration for a future seventh berth. Royal Caribbean coordinated the study with FPL, who determined the transmission and medium-distribution system upgrades needed to provide grid power for this program. The shore power program, for both port and FPL infrastructure and equipment, was estimated to be on the order of $150-160 million.

Port Pensacola. The Port has already installed shore power at Berth #1 and Berth #5 to support vessel operators in reducing fuel use which in turn reduces operating cost and improves local air quality, while also creating a quieter and more community-friendly port environment with proximity to downtown Pensacola. By implementing shore power, the Port aims to advance more sustainable operations in alignment with broader environmental goals and provide value-added infrastructure to appeal to current and prospective tenants.

Voices from Florida's Seaports

Main goals of implementing shore power are "to be responsive to the Port's customer needs…be a good steward of the environment by reducing air emissions."

"These global mandates and emerging carbon levies create a ripple effect—vessel operators now expect port infrastructure (e.g., shore power, bunkering for biofuels or hydrogen) to comply with lower-emission operations."

"More ships are being built to be capable of shore power. An operational and financial benefit would be to offer shore power as a service to customers of the port."

"Electrifying the mobile harbor cranes will result in environmental, financial, and operational savings. Tenants have previously communicated their own interest in environmental, financial, and operational savings."

"We want to be ready and deploy [shore power for new terminals] when it makes sense; provided the cruise lines sail ship to shore-ready ships."

"Regulations are influencing the Port's customers and we are responding to their needs."

Drivers of Port Electrification

The interest in electrifying ports lies primarily with the following key drivers: **(1)** improving operational efficiency and increasing capacity and worker safety, which are important elements to be competitive with other ports for cargo market share in the region; **(2)** reducing air emissions to improve public health and advance global maritime carbon reduction goals; and **(3)** enhancing resiliency and adaptability to extreme weather events and natural disasters. This section explores these drivers.

Modernizing to Improve Efficiency and Safety

Many port facilities are in the process of updating their facilities to improve their efficiency, capacity, throughput, and safety, which often entails increased facility electrification. Modernization of marine terminals is increasingly becoming necessary for ports and terminal operators to remain competitive within the maritime industry, particularly when competing for cargo business with other ports in-state, within the region, and along the eastern seaboard. As ship sizes and cargo volumes increase, which has been the trend within the maritime industry over the last several decades, cargo terminals must be able to accommodate these increases. The communities and infrastructure that surround ports, as well as developments within port jurisdictions, have made it challenging to add new terminals and/or expand existing terminals. Thus, the primary (and perhaps only) way to increase cargo capacity and throughput to remain competitive, is optimization and densification of terminals, which is generally accomplished with electrification.

For the major Florida ports, there is an increasing need to expand cruise business to support forecasted growth of the industry. Within several of the major cruise ports – PortMiami and Port Everglades – adding new cruise terminals and berths is competing with the existing cargo terminals and forecasted cargo growth, particularly for containerized cargo. An example of this is densification of the South Florida Container Terminal in PortMiami, which is undergoing conversion of the container yard to eRTG operations to

accommodate current and future container throughputs, resulting from realignment of the terminal to facilitate cruise terminal development and expansion.

The competitiveness of the smaller Florida ports with the major Florida ports, as well as the overall competitiveness of the Florida ports with the ports in other states within the U.S. southeast, are also driving modernization, expansion, and electrification. The smaller Florida ports have generally gravitated toward niche cargo and/or maritime industries to remain competitive. Although growth of these terminals is generally more specific to a cargo or industry type, rather than the overall port complex, electrification could be considered for optimization of operations for expansion and improved financial performance.

As previously noted, the Florida ports must also compete with out-of-state ports. Florida ports are already dominating the cruise industry; however, the container ports face a competitive market. The primary container ports in Florida – Everglades, Jacksonville, Miami, and Tampa – are competing for cargo with the ports in the U.S southeast and up the eastern seaboard. Some of these ports, such as Savannah, GA and Charleston, SC, have implemented capital programs to add new terminals and/or expand existing terminals. These programs have looked to densification and electrification to increase container capacity and throughput. If the Florida container ports want to remain competitive, they may need to follow suit. Port Everglades, for example, is working with their container terminal operators to evaluate and implement terminal densification and electrification.

A common example in container-terminal operations, including in Florida ports is replacement of currently operating diesel top-handlers and switching some of their operations over to electric RTGs (eRTGs). RTGs are an efficient approach to increase capacity within container terminals and railyards. Terminals generally do not have the ability to increase acreage, thus the only way to increase throughput is to densify (and optimize) operations. Densification requires stacking containers higher and more closely together within container storage yards and/or building rail tracks more closely together in railyards. Switching from top-pick or reach-stackers to RTG-based container storage or railyards allows for densification and provides an opportunity to switch from diesel equipment to electrified equipment, i.e., eRTGs. This type of terminal improvement project also generally has a high return on investment, with eRTGs providing both significant throughput capacity increases, as well as reduced operating costs, particularly energy and maintenance costs, compared to diesel top-handlers or reach-stackers.

Exhibit 2. Top Handler vs. RTG

RTGs also improve worker safety compared to top-handler operations. Consider the photos below of a top-handler (top) and an RTG (bottom). The RTG is an overhead crane type and operates on a fixed path. By comparison, the top-handler operates by freely roaming over paved areas, including backing up as needed into aisles to adjust

position and access containers. This means that the positions and movements of top-handlers are inherently more unpredictable than RTGs, and that their paths of travel tend to frequently intersect with terminal tractors and street trucks, whereas an RTG has a largely separated and defined operating envelope. Thus, in addition to increasing capacity, RTG operations (as well as other types of overhead cranes) result in safer operations compared to open-pavement type container handling equipment (e.g., top-handlers and reach-stackers), with a lower risk of collisions.

It should be noted that an advanced form of terminal electrification is automation of terminal operations. Several container terminals within the U.S. (three in California and one in Virginia), and many terminals around the world, have converted to automated operations using automated stacking cranes (ASCs). Automated container terminals significantly improve operational efficiency, capacity, throughput, and safety, even over RTG operations. The challenges for terminal automation are the significant capital costs for electric equipment (ASCs), terminal lease agreement durations that enable return on investment for the equipment costs, and alignment with labor agreements.

Surveyed Florida ports also cited increased maintenance and fuel costs with aging equipment as a potential driver towards electrification. They noted that as equipment reaches its end of usable life, it may be more practical to replace existing diesel equipment with electric equipment to reduce energy and maintenance costs, while also reducing emissions and enabling environmental compliance.

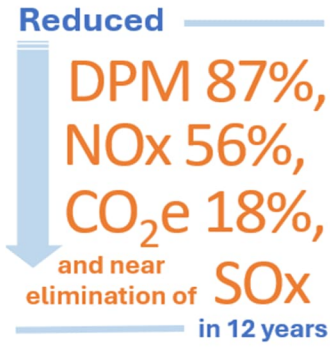
Reducing Emissions for Global Maritime Goals and Public and Worker Health

At-berth shore power systems allow vessels to turn off their diesel-powered auxiliary engines while at berth, which eliminates direct air emissions at the port when docked. In the absence of regulations that mandate local (or even state) use of shore power, implementation of shore power systems in Florida are expected to be the result of port and cruise/shipping policies and/or environmental programs that require emissions reductions and, in some cases, direct the use of shore power. For ports, consideration for the surrounding community and environment is an overarching goal for implementation of shore power, whereas for cruise and shipping lines, compliance with IMO regulations and company sustainability policies drive consideration for the use of shore power. As these requirements could affect all ports within Florida, implementation of shore power would theoretically (and eventually) create a level playing field between the Florida ports.

There have been several emissions studies performed in Ports across the U.S., including Port Everglades, which conducted a baseline air emissions inventory in 2015 to understand emissions from maritime-related equipment, including ocean-going vessels, harbor vessels, cargo handling equipment, and on-road vehicles. The Port Everglades analysis demonstrates that ocean-going vessels are

What are your main goals and objectives for implementing shore power?
"To be responsive to the Port's customer needs. To be a good steward of the environment by reducing air emissions." **- Florida Port**

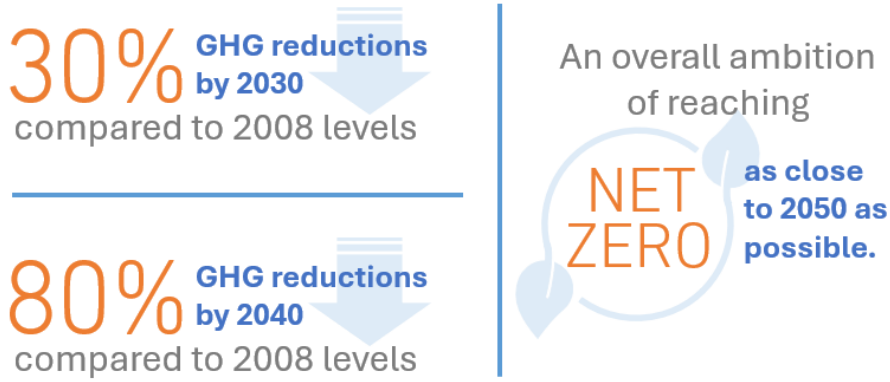
the largest source air emissions, followed by cargo handling equipment.[1] Following this report, in 2023, Port Everglades announced plans to implement shore power, with full implementation projected to reduce total NO_x emissions by 75% and SO_2 emissions by 51%.[2]



The Ports of Los Angeles and Long Beach have demonstrated substantial reductions in overall port-related emissions over 12 years compared to their 2005 baseline year following the implementation of shore power in 2004. The joint 2017 Clean Air Action Plan (CAAP), which is the most recent update of the CAAP for these two ports, reported DPM reduced by 87%, NOx reduced by 56%, CO_2e, reduced by 18%, and near elimination of SOx.

International Maritime Regulations for Emissions from Ships

The global shipping and cruise industry is grappling with marine emissions reductions initiatives worldwide. In response to International Maritime Organization (IMO) regulations, shipping and cruise lines are evaluating various alternatives to reduce carbon emissions. The IMO adopted its strategy on the reduction of greenhouse gas (GHG) emissions from ships in 2023, which established global emissions intensity reduction goals for ships in 2030 and 2040 on the way to net zero as close to 2050 as possible.[3] Cruise Lines International Association (CLIA) member cruise lines and the International Chamber of shipping (ICS) member shipping lines are actively pursuing net zero emissions by 2050 in alignment with IMO's 2023 GHG emissions reduction strategy.



In April 2025, IMO approved the Net Zero Framework as the regulatory mechanism for implementing the 2023 GHG strategy. The Net Zero Framework was to be fully adopted in October 2025 during an extraordinary session of IMO's Marine Environmental Protection Committee (MEPC) and has instead been delayed for 12 months. Even so, IMO's Intersessional Working Group on the Reduction of GHG Emissions from Ships is continuing to work on guidelines for implementing the Net Zero Framework. It is expected that this regulation, once officially adopted, will be viewed in the same context as other similar IMO regulations affecting the entire shipping industry and all global cruise regions, resulting in

[1] Port Everglades, *Port Everglades 2015 Baseline Air Emissions Inventory* (December 2016), https://assets.simpleviewinc.com/simpleview/image/upload/v1/clients/porteverglades/WV_FINAL_Port_Everglades_2015_Baseline_EI_Report_26_Dec_16_scg_b68278da-779e-4c40-92ab-ea940b2b3f99.pdf

[2] Port Everglades, *Port Everglades completes Shore Power Master Plan for Cruise Terminals* (February 2023), https://www.porteverglades.net/articles/post/port-everglades-completes-shore-power-master-plan-for-cruise-terminals/

[3] IMO, *2023 IMO Strategy on Reduction of GHG Emissions from Ships* (July 2023), https://www.imo.org/en/ourwork/environment/pages/2023-imo-strategy-on-reduction-of-ghg-emissions-from-ships.aspx

changes to ship operations and adoption of relevant technologies to achieve compliance. In fact, shipping and cruise lines are evaluating various alternatives to reduce carbon emissions and increasingly looking to incorporate alternative fuels into their vessels – primarily liquefied natural gas (LNG) and methanol. For example, LNG-powered cruise and container ships are currently calling at Port Everglades, and the Port now provides LNG bunkering services and is working toward the ability to offer methanol bunkering.

The Practicalities of Complying with IMO Emissions Reduction Goals

The IMO introduced two new major indices in 2023 to help meet 2030 carbon intensity reduction targets: the **Carbon Intensity Indicator (CII)** and **Energy Efficiency Existing Ship Index (EEXI)**. CII measures how efficiently a vessel above 5,000 GT transports goods or passengers. EEXI, which only needs to be attained once in a ship's lifetime, is a measure to reduce GHG emissions related to the technical design of a ship. As of January 2023, all ships are required to report and monitor their attained EEXI and annual CII. Ships are rated A to E based on their annual CO_2e emissions and distance traveled. D and E ratings require approved corrective action plans.

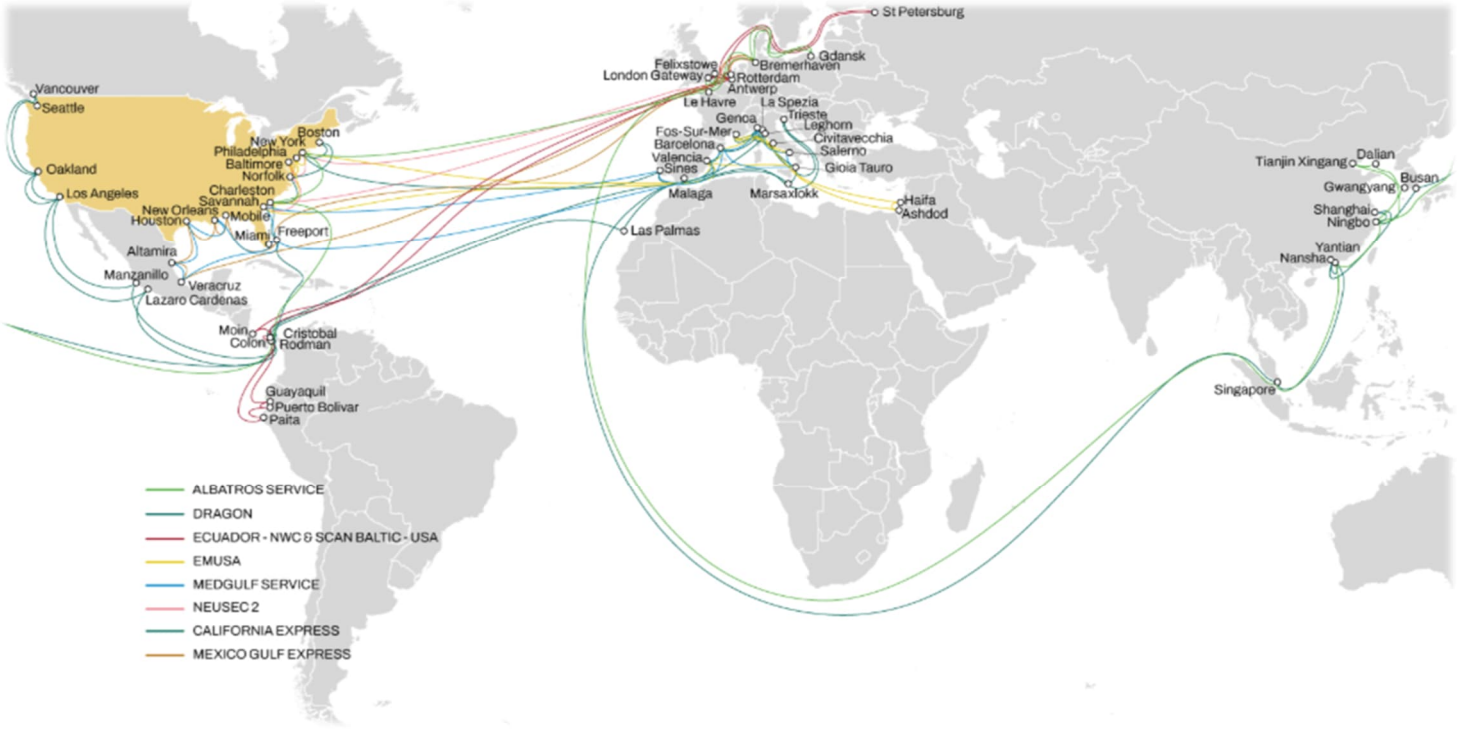
Cruise lines have expressed that with distance traveled as part of the equation, longer in-port times and lower cruising speeds could lead to unfavorable CII ratings for cruise ships, even though these typical operations may lower fuel consumption and CO_2e emissions. Cruise lines are concerned that they may only be able to achieve better CII ratings by increasing ship speeds, reducing in-port times, or expediting retirement of older, less efficient ships, which could have significant implications for some cruise regions. To meet these requirements, there will likely also be increased emphasis from the cruise lines on the use of alternative, lower-emission fuels, and shore power while in port.

Additionally, the European Union's (EU) Fit for 55 Legislation will require compliance from the shipping and cruise lines. This regulation, which has a goal of reducing net GHG emissions 55% by 2030 and achieving climate neutrality by 2050, focuses on shore power and alternative fuels, such as LNG, methanol, and hydrogen. By 2030, all cruise ships over 5,000 GT will be required to use shore power while moored at major EU ports. While not binding in the U.S., this regulation sets a global precedent and increases the likelihood of vessels compliant with this regulation calling at Florida and U.S. ports.

These international regulations are expected to accelerate collaboration between the major cruise and shipping lines and their seaport partners to develop strategies to reach their net-zero targets, including implementing shore power systems. The advancement of a cruise shore power program at Port Everglades and PortMiami's installation of shore power systems, for example, illustrates that the cruise and shipping lines clearly exert considerable influence. Today, over 50% of cruise ships and the trans-oceanic container ships are shore power capable, and this number likely will continue to increase. Shore power is expected to increase in the container industry, with most new build vessels having shore power capabilities, particularly in the mega-size classes that include Very Large Container Ship (VLCS) and Ultra Large Container Ship (ULCS) classes. This has been the case for some time now as most of the mega-size classes have been deployed to the Pacific Ocean for the East Asia to U.S shipping routes, particularly with the shore power requirements at the major North

American West Coast ports. Since the opening of the third set of (larger) locks at the Panama Canal, many of these larger container ships (VLCS class) from East Asia, including shore power capable container vessels, are now traversing the Panama Canal and calling at East Coast and Florida ports. Exhibit 3 illustrates the numerous transatlantic service routes that connect Florida and other U.S. ports to Europe and East Asia for MSC, one of the largest global shipping and cruise lines.

Exhibit 3. Transatlantic Service Routes from Europe to U.S.[4]



With elevated attention on the cruise industry around the world for increased sustainability and emissions reduction, the cruise lines have all established programs that implement initiatives aimed at reducing emissions and promoting sustainable practices. Most major cruise lines have adopted sustainability policies that include emission reduction targets. The container industry, led by the global shipping lines, has also implemented similar programs.

Exhibit 4 highlights that all major cruise and shipping lines calling at U.S. ports have net-zero GHG commitments and most have also already set at least one supporting interim reduction target, underscoring the immense need for emissions reductions strategies by both ports and tenants (terminal operators) that receive vessels from these lines. Port electrification is an emission reduction strategy that complements alternative fuels and energy efficiency initiatives that are essential to meet net-zero commitments.

[4] MSC, *Our Service Maps and Route Details Mediterranean Area to USA*, (2025), https://www.msc.com/en/solutions/our-trade-services/transatlantic-services/transatlantic-europe-to-usa

Exhibit 4. Commitments and Goals of Select Tenants at Florida Ports

Tenant	Line Type	Net-Zero Commitment	Pledged Goals
Carnival Corp.	Cruise	✔	20% intensity reduction by 2026[5]
Royal Caribbean Group	Cruise	✔	Net-zero ship by 2035[6]
Norwegian Cruise Line	Cruise	✔	25% intensity reduction by 2030 (Scope 1, 2, and partial Scope 3)[7]
Virgin Voyages	Cruise	✔	Full fleet shore power by 2026[8]
MSC	Cruise/Shipping	✔	9% absolute reduction by 2030 (Scope 1 and 2)[9]
CMA-CGM	Shipping	✔	30% by 2030; 80% by 2040[10]
Crowley	Shipping	✔	42% absolute reduction by 2030 (Scope 1 and 2)[11]
Hapag-Lloyd	Shipping	✔	1/3 (~33%) absolute reduction by 2030 (fleet operations)[12]
Maersk	Shipping	✔	35% Scope 1 absolute reduction by 2030; 100% Scope 2 absolute reduction by 2030[13]
Ocean Network Express	Shipping	✔	70% intensity reduction by 2030 (Scope 1)[14]

Note: *Tenants include terminal operators and shipping and cruise lines.*

Considering all shipping lines and most large terminal operator/stevedoring companies have sustainability and emissions reduction programs, Florida's ports will likely face increasing pressure to offer shore power to enable cruise and shipping lines to comply with international regulations and their own emissions reductions goals. Cruise ports in the U.S. without shore power may at some point in the future be at a competitive disadvantage to those with shore power.

[5] Carnival Corp., *2024 Sustainability Report,* (August 2025), https://www.carnivalcorp.com/wp-content/uploads/2025/08/FY2024-Sustainability-Report-FINAL.pdf

[6] Royal Caribbean Group, *2024 Seastainability Report Executive Summary,* (2025), https://royalcaribbeanmedia.com/files/public-file/2025-Jul-8-Tue/Executive-Summary-Report.pdf

[7] Norwegian Cruise Line Holdings LTD., *2024 Sail & Sustain Report,* (June 2025), https://d1io3yog0oux5.cloudfront.net/_2cf2ac9cd1744e035f3b2865b9eaf443/nclhltd/db/1204/11621/file/NCL002_2024-Sail-and-Sustain-Report-P8e-ACCESSIBILITY.pdf

[8] Virgin Voyages, *Climate Action Plan,* (September 2022), https://www.virginvoyages.com/dam/jcr:98a5fce3-8005-44d7-9361-e7f253e6d5dc/VV_104ClimateActionPlan.pdf

[9] MSC, *Our Journey to Net Zero,* (July 2025), https://www.msc.com/en/sustainability/enabling-logistics-decarbonization?_gl=1*1a7zps0*_up*MQ..*_ga*MTc5MTUxNTIyNC4xNzcwMzEwOTk3*_ga_9HMJRMP77C*czE3NzAzMTA5OTckbzEkZzEkdDE3NzAzMTEwMTYkajQxJGwwJGgwJGR0YkFtRjdkbHJvY2RPWDN2YzgtZzZ5a3dwVFYxbkZkSTJB

[10] CMA-CGM, *We Act For Our Planet,* (2026), https://www.cmacgm-group.com/en/sustainability-and-innovation/acting-for-planet

[11] Crowley, *2022 Sustainability Report,* (June 2023), https://www.crowley.com/wp-content/uploads/sites/7/2023/06/Crowley-2022-Sustainability-Report.pdf

[12] Hapag-Lloyd, *Sustainability Progress Report 2024*, (March 2025), https://www.hapag-lloyd.com/content/dam/website/downloads/press_and_media/publications/Hlag_Sustainability_Report_2024.pdf?msockid=1d1908ff92b465592f121d0093626433

[13] Maersk, *Annual Report 2025,* (February 2026), https://investor.maersk.com/static-files/75fac9de-c2cc-421c-8eaf-17d5c5d86135

[14] Ocean Network Express, *Sustainability Report 2025,* (September 2025), https://www.one-line.com/sites/g/files/lnzjqr776/files/2025-09/ONE_Sustainability%20Report%202025.pdf

Electrifying Terminal Equipment for Public and Worker Health

While shore power is a critical component to reaching emission reduction and net zero goals, electrifying port and terminal equipment also provide substantial benefits by eliminating diesel fuel or gasoline exhaust that expose the surrounding communities and workers employed within the port to ground-level air emissions that are harmful to human health, while simultaneously reducing the direct release of GHGs into the atmosphere.

The three charts below beginning with Exhibit 5 are based on fleet average emission rates from the *Port of Los Angeles Inventory of Air Emissions 2023*, which provides comprehensive data on fleet average emissions and demonstrates emissions reductions benefits from switching to electric equipment. The data illustrates potential reductions in NOx, PM_{10} (i.e., particulate matter with an aerodynamic diameter of 10 micrometers or smaller), and CO_2 equivalent (CO_2e, which factors in emissions of greenhouse gases CH_4 and N_2O) when converting from diesel to electric for several equipment types. Specifically, NOx emissions can be reduced by more than 90% for all equipment types when switching from diesel to electric. PM_{10} emissions can be reduced by 76% to over 90%, with the largest reductions from switching to electric cranes. Note that due to more stringent regulations in California, these average emissions rates are almost certainly lower for equipment operating at the Port of Los Angeles than typical Florida terminal fleets. Even so, these results show substantial reductions in air emissions, with results for Florida fleets likely to exceed those shown in the charts below in most cases.

It is important to understand that the emissions in the graphs below for electric equipment are indirect emissions from the purchase of electricity and occur at the utility source, and not from the equipment itself like the diesel-powered versions. This means that switching from diesel to electric equipment reduces the ground-level emissions at the port from this equipment to zero.

Exhibit 5. Annual NOx Emissions Reductions from Converting to Electric Equipment

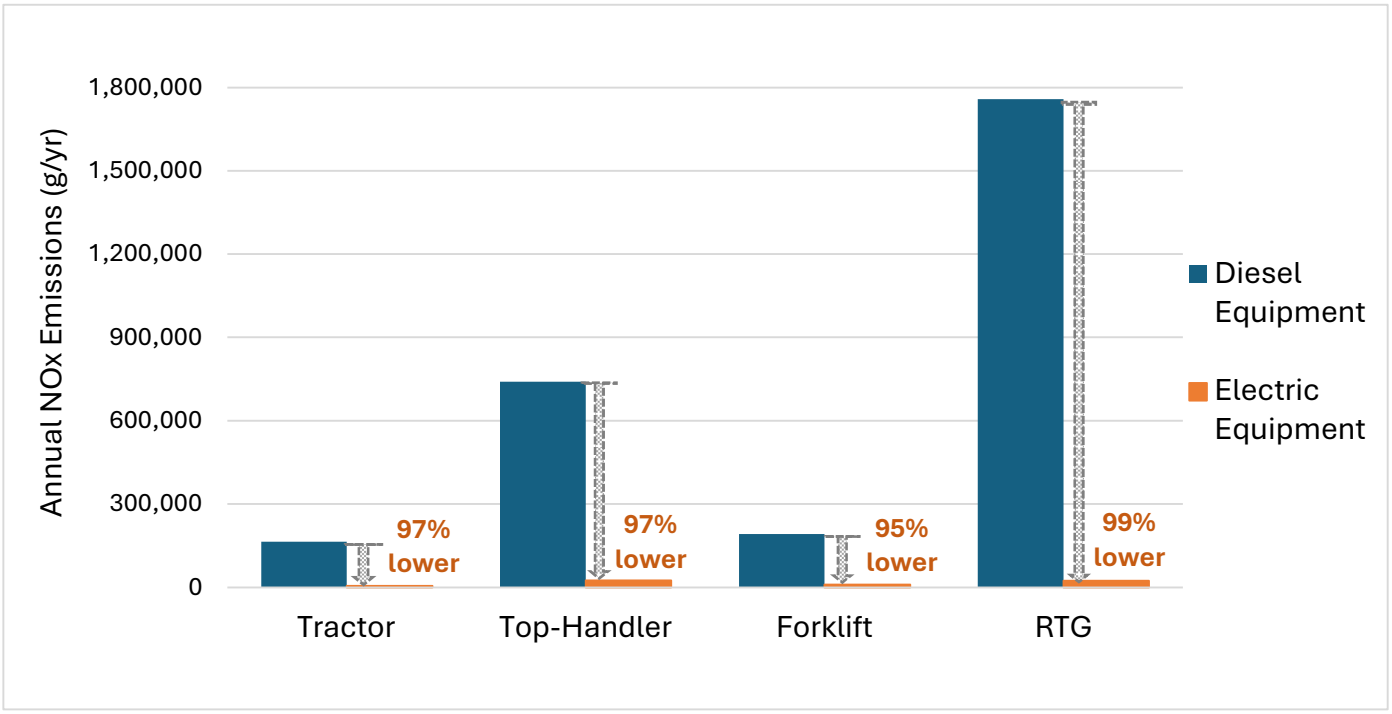


Exhibit 6. Annual PM_{10} Emissions Reductions from Converting to Electric Equipment

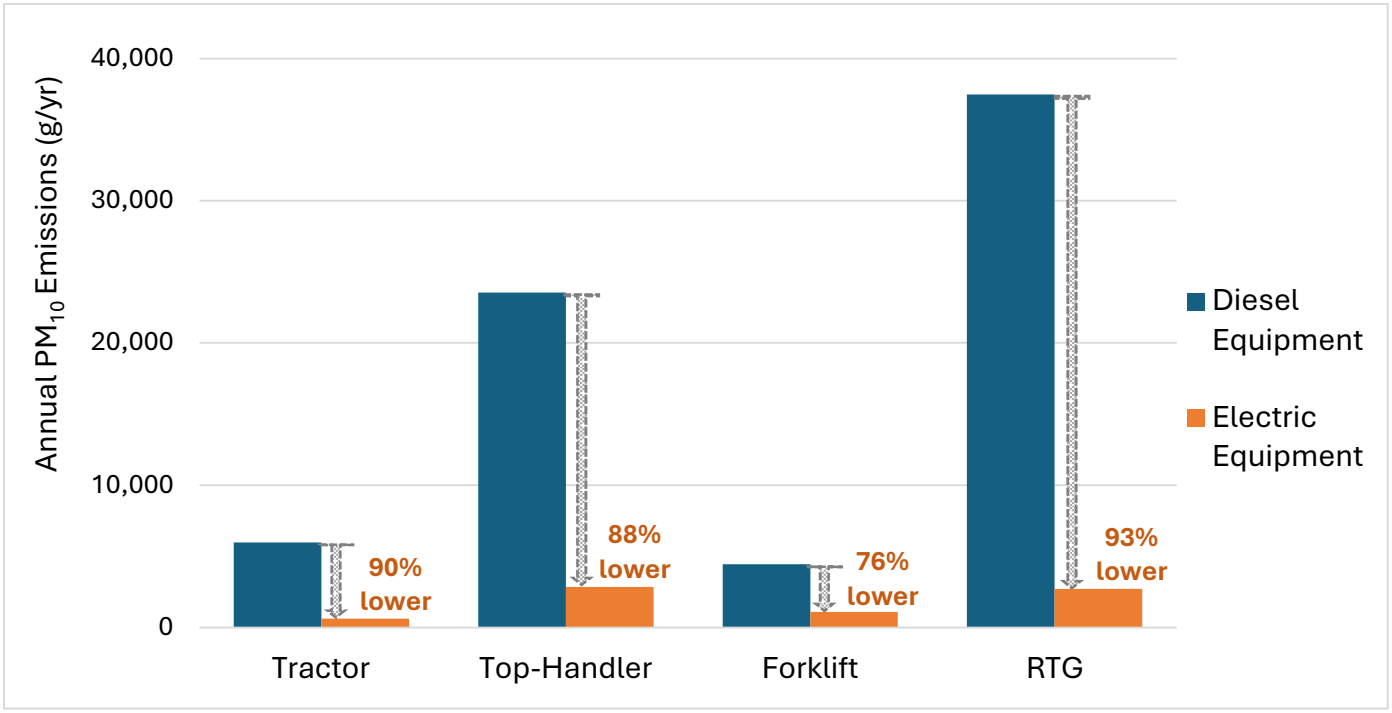
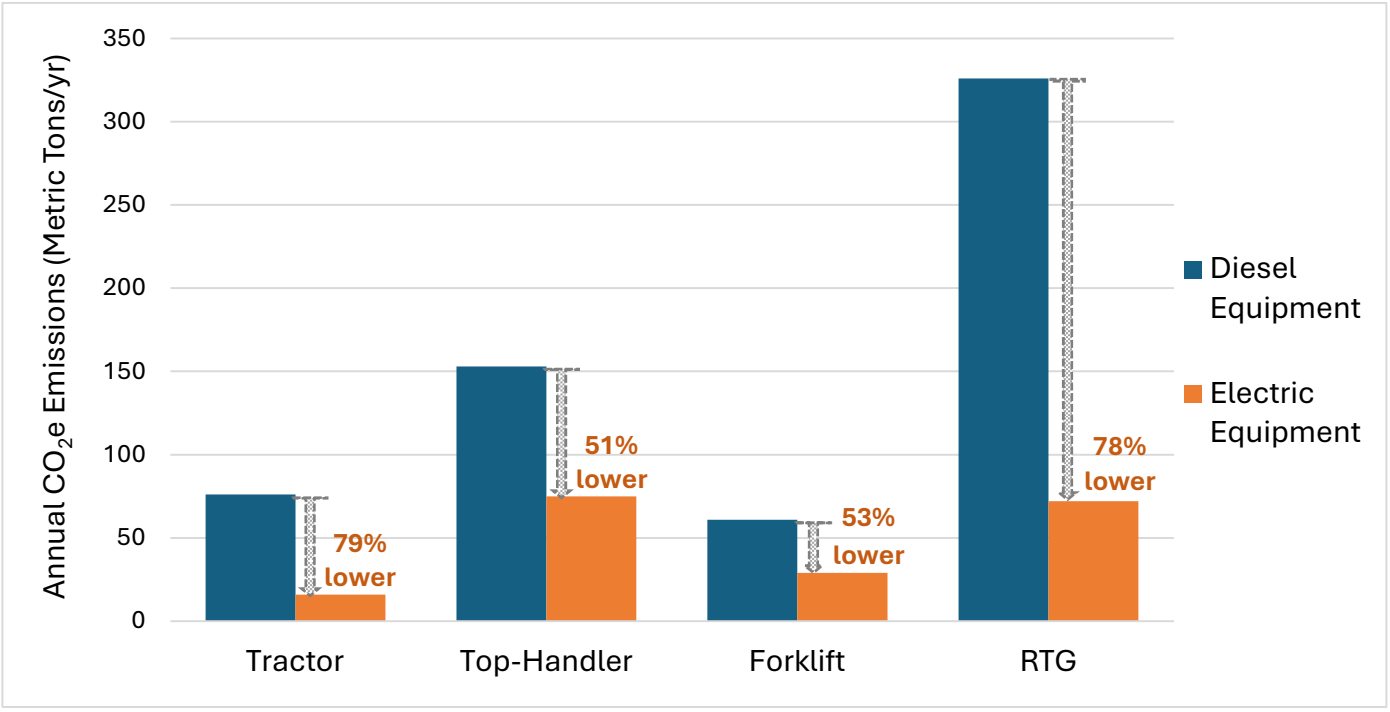


Exhibit 7. Annual CO_2e Emissions Reductions from Converting to Electric Equipment



Power Utilities Powering Ports

An evaluation of terminal equipment electrification and shore power, whether to achieve improved operational efficiency and capacity and/or meet emissions reductions goals, begins with understanding that port electricity is typically supplied by a regional power grid, such as Florida Power & Light (FPL) in the case of many of Florida's ports. Other port power utilities in Florida include Duke Energy Florida and various municipal utilities. The emissions associated with producing electricity for ports will vary depending on the relative shares of zero- and low-emission sources (e.g., wind, solar, hydroelectric, etc.) and higher emission sources (e.g., coal, fuel oil, natural gas, etc.) used by the utility to generate electricity. The relative fuel mix changes over time and even vary by hour depending on electricity demand. As the power grid becomes cleaner and more efficient over time, the emissions reductions realized from port electrification will increase.

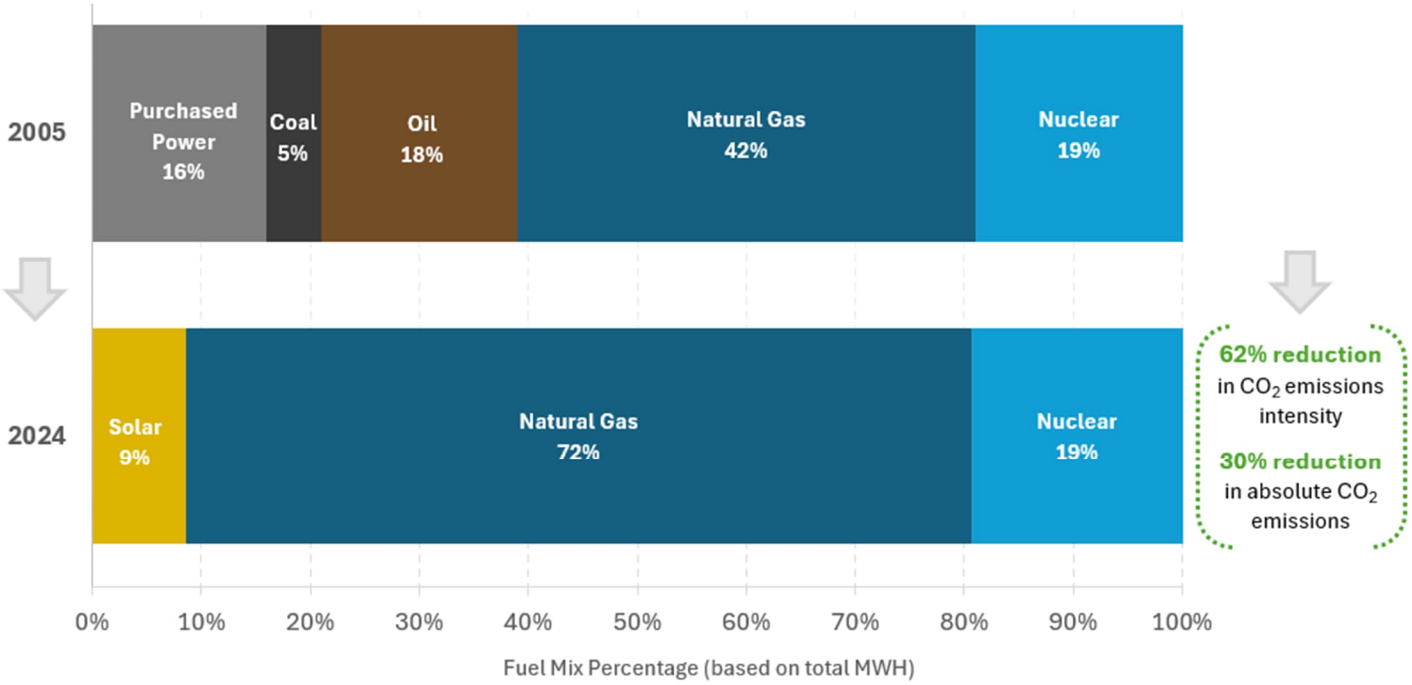
Are there specific concerns or limitations related to the port's current infrastructure that might impact this transition?

"No concerns or limitations, FPL is extremely responsive."

- Florida Port

In Florida, FPL has been working progressively towards a lower-emission power (energy) mix over the last 20 years. These changes are seen in Exhibit 8 below, which depicts FPL's energy mix progression from 2005 to 2024, including the introduction of zero-emission solar and replacing coal- and oil-based power generation with lower-emission natural gas. By electrifying terminal operations and adopting shore power, ports support the progress regional utilities are making toward continually improving the availability of lower- and zero-emissions energy and can anticipate benefiting from this transition as it unfolds over time.

Exhibit 8. Florida Power & Light Energy Mix Progression[15,16]



[15] Next Era Energy, *2025 By the Numbers*, (2026), https://www.investor.nexteraenergy.com/sustainability/sustainability-resources

[16] Next Era Energy, *2023 Sustainability Report*, (2024), https://www.fpl.com/content/dam/fplgp/us/en/environment/pdf/2023_NEE_Sustainability_Report_Final.pdf

Enhancing Resiliency for Adaptability

Coastal storms, sea level rise, and extreme weather events are increasing in frequency and severity, causing flood hazards from high tides, heavy precipitation, and storm surge. These events can restrict access to key port areas, damage infrastructure, disrupt fuel supply chains, and impact goods movement (both import and export); all of which affect the local communities that surround ports and business within their regions. Seaports are facing growing challenges to maintain operational continuity alongside growing global pressure to modernize and reduce emissions. Ports globally are turning to electrification not just for environmental performance, but as tools to enhance resilience.

Traditional resilience strategies focus on physical hardening, such as elevating infrastructure, hardening waterfront structures, managing stormwater, and floodproofing buildings. Electrifying landside equipment and enabling shore power connections can complement traditional resilience measures by supporting operational flexibility, environmental safety, and recovery efforts and partially decouple port operations from disruptions. While the co-benefits are different from traditional structural resilience, they contribute to a safer and more adaptable environment under uncertain and hazardous conditions.

Operational Flexibility

Electrification supports operational flexibility by allowing ports to maintain critical functions even when fuel or electricity supplies are disrupted. Battery-powered cargo-handling equipment can be pre-charged or staged in advance of forecasted events, enabling terminals to continue operations without delay. Microgrids and on-site energy (battery) storage further enhance flexibility, allowing ports to manage peak demand and sustain operations during regional grid outages.

Port of Virginia. Terminal 6 employs microgrid-enabled systems that allow container handling to continue during utility outages, illustrating operational resilience in a high-volume cargo environment.[17]

Port of San Diego. The Port currently operates four solar photovoltaic systems (PV), including at the Port's Administration Building and Cruise Ship Terminal. These systems combined generate approximately 530,000 kWh of electricity annually, equivalent to enough energy to power 45 homes for one year.

Port of Long Beach. A hydrogen tri-generation system was installed at Toyota's auto terminal, which generates renewable electricity, hydrogen, and water from directed biogas, The system, producing 2.3 MW of renewable electricity and up to 1,200 kilograms per day of hydrogen, supports Toyota's operations at the port, reducing CO_2 emissions by over 9,000 tons annually, mitigates NOx emissions and diesel consumption while supplying water for car wash operations, contributing to water conservation efforts. Additionally, excess electricity feeds into the local grid, enhancing its resilience and sustainability.

[17] Port of Virginia, *Terminal 6 Microgrid Enhances Operational Resilience,* Port of Virginia Press Release, (September 2023).

Environmental Safety

Shore power and electrification can improve environmental and operational safety by reducing risks to port workers, vessels, and infrastructure during extreme weather events. Replacing diesel-powered equipment and eliminating on-site fuel handling reduces the potential for spills, fires, or contamination during storms or flooding. Electrified equipment is easier to control and safer to operate in emergency conditions.

Port of New Orleans. The Port has deployed battery electric cargo handling equipment, reducing fuel-related hazards during hurricane threats, and improving worker safety during emergency response operations. [18]

Port of Jacksonville. The Port plans to implement a series of initiatives (known as the JAXPORT EXPRESS Project) aimed at transforming the port into a sustainable and efficient hub for international and domestic trade. The project includes installation of electrified refrigerated container stacks and procurement of hybrid-electric RTGs and battery-electric yard tractors.

Disaster Recovery

Beyond flexibility and safety, shore power strengthens recovery and resilience, enabling ports to restore operations quickly after disruptions. Elevated and enclosed infrastructure protects critical electrical systems from flood damage, while on-site energy storage and microgrids sustain essential operations during outages, reducing reliance on fuel-based generators.

PortMiami. The Port has elevated and floodproofed its shore power substations, allowing cruise and cargo operations to resume quickly following hurricanes.[19]

Port of Seattle. Pier 66 shore power expansion allows for cruise operations to quickly restart after disruptions, embedding resilience into standard operating procedures.[20]

Port of Hueneme. The Port invested $40 million to elevate and enclose critical infrastructure to facilitate faster recovery from future storms after severe flooding damaged its shore power system in 2023.[21]

Port of San Diego. Tenth Avenue Marine Terminal, a solar-powered microgrid with battery storage enables "islanding," is sustaining lighting, communications, and essential operations immediately after grid outages.[22]

These examples highlight how combining electrification with traditional resilience measures creates a robust foundation for climate adaptation. Electrified ports can sustain essential functions, protect workers and equipment, and recover more rapidly from disruptions while simultaneously reducing emissions and improving local air quality. In this way, electrification serves a dual purpose: advancing decarbonization goals and building operational resilience for an increasingly uncertain climate future.

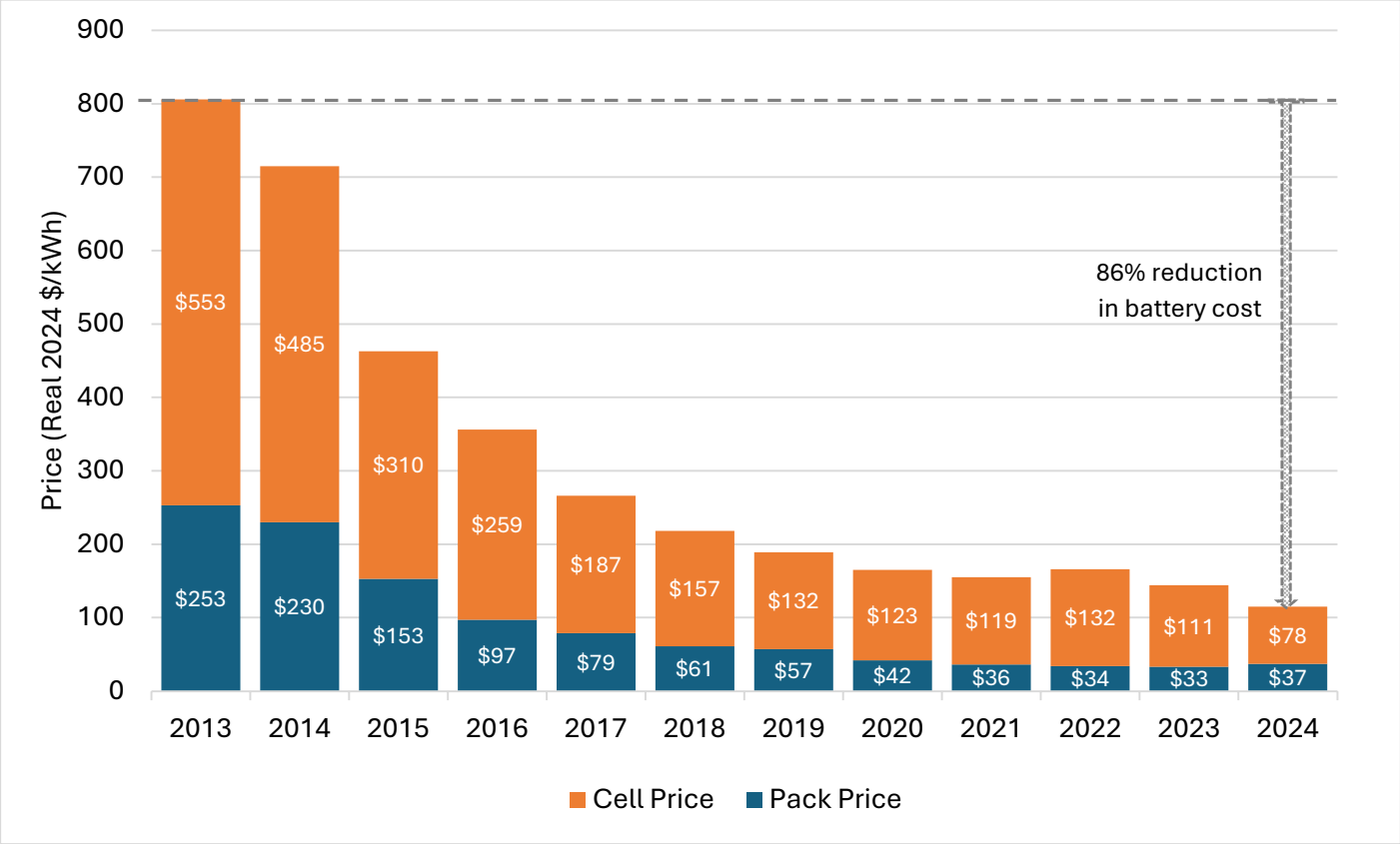
[18] Port of New Orleans, *Electrification of Container Handling Equipment Improves Safety and Operational Resilience*, Port of New Orleans Reports, (December 2022).
[19] PortMiami, *PortMiami Shore Power Substations Elevated to Improve Post-Storm Recovery,* Miami-Dade County Press Release, (May 2024).
[20] Port of Seattle, *Port of Seattle Advances Pier 66 Shore Power Expansion to Serve 100% of Cruise Fleet by 2027,* Port of Seattle News, (August 2024).
[21] Port of Hueneme, *Port of Hueneme Advances Shore Power Resilience Upgrades After 2023 Storm Flooding,* Port of Hueneme Board Reports, (March 2024).
[22] Port of San Diego, *Port's Tenth Avenue Marine Terminal Microgrid Earns National Innovation Award,* Port of San Diego Press Release, (October 2023).

Electric Terminal Equipment

Electrification of port cargo handling equipment (CHE) has advanced considerably over the last two decades. Electric versions of nearly all types of CHE are more widely available for purchase and have reached technical and operational feasibility, including the types of CHE commonly used in terminal operations in Florida.

Considering that a critical component of electric equipment is the battery, the cost trend that has occurred for batteries over approximately the last decade is noteworthy. Battery costs have declined by 86% since 2013, as shown in Exhibit 9. This means that the cost of the battery is becoming a less significant contributor to the cost of the electric equipment over time and that the purchase cost of electric equipment should continue to trend down over time.

Exhibit 9. Volume-weighted average lithium-ion battery pack and cell price split, 2013-2024



Source: *Bloomberg NEF. Note that historical prices have been updated to reflect real 2024 dollars. Weighted average survey value includes 343 data points from passenger cars, buses, commercial vehicles, and stationary storage.*

Equipment Case Studies

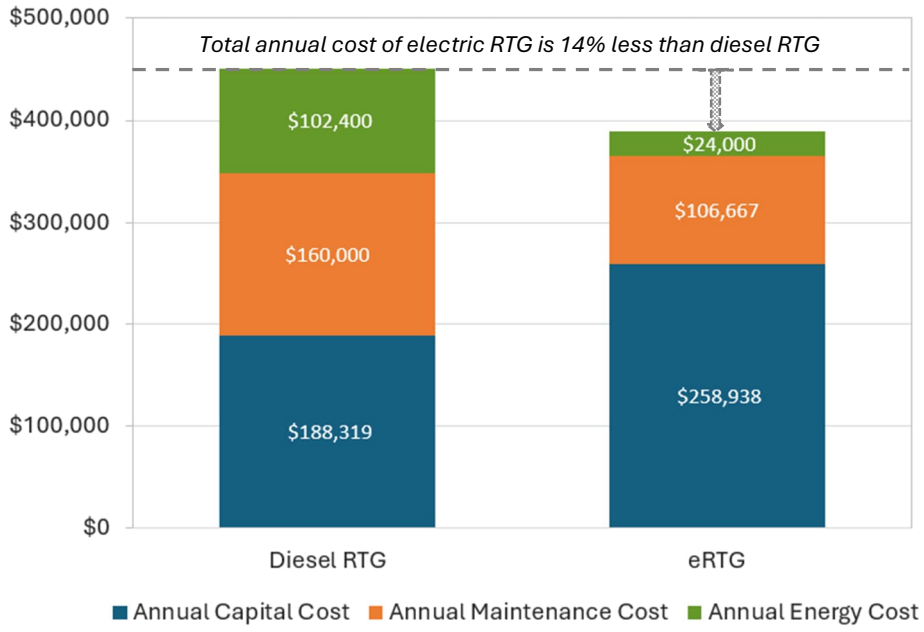
This section evaluates the capital and operating costs of four common equipment types for demonstration purposes: **RTGs, Top-Handlers, Terminal Tractors, and Forklifts**. Estimated costs for each of these equipment types assume typical operating parameters and use inputs appropriate for the Florida context, and could vary significantly depending on the purchase volume, equipment model and size, market conditions, and other factors. When initially deploying electric equipment, operators must also consider the costs of charging stations as an additional investment.

Rubber-Tired Gantry Cranes (RTGs)

As previously established, RTGs provide the largest opportunity for emissions reductions when switching from diesel equipment to electric, while also providing additional safety benefits and improved throughput capacity. Unlike other types of cargo handling equipment, RTGs operate over fixed runways rather than on open pavement and eRTGs are typically powered by either a cable reel or busbar system. Cable reel-based electrification infrastructure is increasingly popular for eRTG operations as it allows co-locating of data cables, which improves the viability of operating eRTGs with remote drivers, which can improve both performance and worker safety, as workers are able to operate cranes from an office building instead of being physically located on the crane. RTGs have become popular for handling containers globally. Worldwide, approximately half of all existing RTGs in operation are electrically powered. Some major U.S. ports are also planning large-scale hybrid RTG operations, such as Georgia Ports Authority.

Exhibit 10 summarizes example annual costs when comparing diesel and electric RTGs for typical units used in a marine container terminal. Although the initial capital cost of an electric RTG is estimated to be about 40% higher than that of a diesel RTG, the annual maintenance and energy costs of an electric RTG are estimated to be around 50% lower than a diesel RTG, with the added benefit of eliminating ground-level emissions from RTG use. This example illustrates that if the capital cost of the equipment is amortized over its 20-year life span (assuming 6% interest over 10 years), the annual cost (including capital, maintenance, and energy) will be 14% lower for an electric RTG.

Exhibit 10. Annual Cost Savings for Electric RTG



RTG Assumptions		
Equipment lifespan	20 years for both diesel and electric models	
Annual operating time	4,000 hours for both diesel and electric models	
Costs	**Diesel Equipment**	**Electric Equipment**
Capital Cost (incl. sales tax)	$2,000,000	$2,750,000
Energy Use and Cost	8 gallons diesel per hour at $3.20 per gallon	50 kWh per hour at $0.12 per kWh
Maintenance cost	$40 per operating hour	$26.67 per operating hour [67% of diesel cost]

It is worth noting that this example excludes the cost of associated electrification infrastructure, which varies depending on existing conditions of electrical infrastructure and the size of the RTG fleet. The Port of Wilmington, DE estimated a cost of about $7,500,000 for infrastructure to support a fleet of eight (8) eRTGs in a 2024 Clean Ports Program application, or about $937,500 per eRTG for associated electrification infrastructure. The Port of Wilmington, DE estimated a cost of about $7,500,000 for infrastructure to support a fleet of eight (8) eRTGs in a 2024 Clean Ports Program application, or about $937,500 per eRTG for associated electrification infrastructure. Like the Port of Wilmington[23], many other ports have applied for and successfully secured grant funding to make the overall cost of implementing eRTG operations more effective, including PortMiami[24] and Port Everglades.[25]

[23] John Carney, *Carney, Carper, Coons, Blunt Rochester Announce Over $127 Million in Federal Funding to Decarbonize Port Wilmington*, Delaware News, (October 2024), https://news.delaware.gov/2024/10/30/clean-ports-program/#:~:text=The%20IRA%20created%20the%20Clean%20Ports%20Program%2C,energy%20future%20*%20Benefit%20environmental%20justice%20communities

[24] The American Presidency Project, *FACT SHEET: Biden-Harris Administration Announces Key Infrastructure Funding to Electrify Ports*, (May 2023), https://www.presidency.ucsb.edu/documents/fact-sheet-biden-harris-administration-announces-key-infrastructure-funding-electrify

[25] Helen Acevedo, *Port Everglades receives $53.3M grant for emissions reduction project*, (November 2024), https://www.wuwf.org/florida-news/2024-11-20/port-everglades-receives-53-3m-grant-for-emissions-reduction-project

Top-Handlers and Reach-Stackers

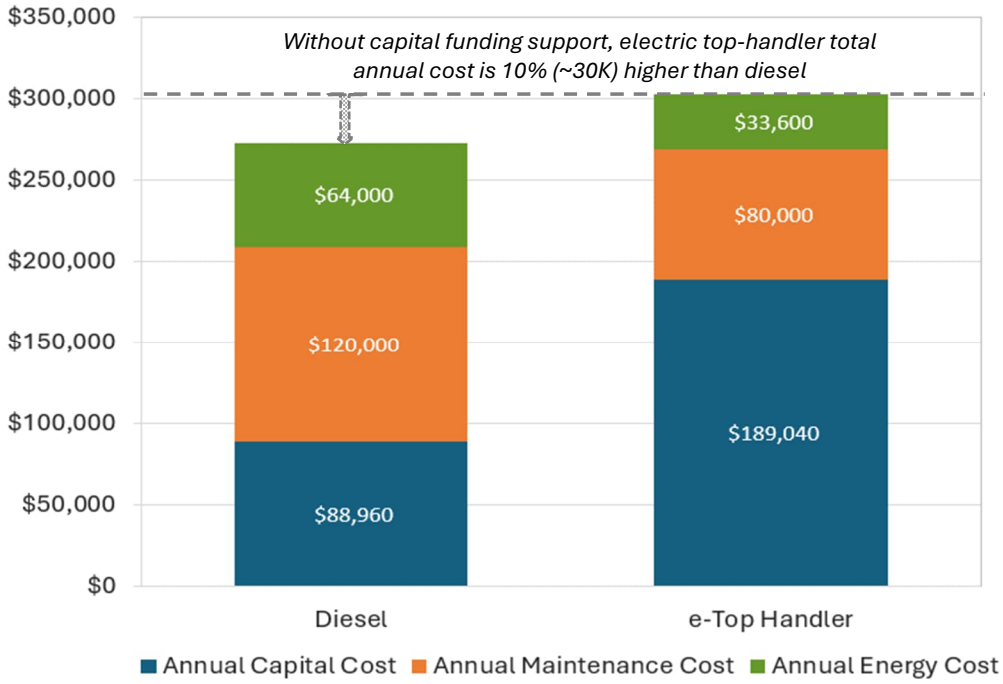
Top-handlers, also known as top-picks, front-end loaders, or loaded container handlers, are commonly used in container and rail intermodal terminals to stack and lift loaded containers and to move containers on and off railcars. Reach-stackers are used for similar applications and have an angled boom which can reach over containers. Of the terminal equipment evaluated in this section, top-handlers have the next highest air emissions output following RTGs.

Depending on the specifications, these types of equipment can have similar capacities, costs, and operating profiles and applications, with both requiring high lift capacities and weights to lift and stack loaded containers. As a result, they require larger batteries to meet higher energy use rates compared to lighter equipment like tractors. Thus, the electric top-handlers or reach-stackers in operation today are generally only for test projects supported by grant funding. For example, there are two grant-funded electric top-handlers in operation as part of a demonstration project at the Port of Los Angeles and one electric Reach-stacker in operation at the Port of Houston.

It is worth noting that many container terminal operators in Florida who operate using top-handlers are currently considering reducing their usage of this equipment type to increase capacity and handle the larger peak container volumes that are associated with growing container ship sizes. Although top-handler equipment still may be needed to some extent, operators in Florida are looking at transitioning a portion of the top-handler fleet to RTG operations to increase efficiency, as these cranes allow for higher density and productivity, especially for serving street trucks and railyards. This is particularly the case with terminals that no longer have the space to accommodate increased container throughput by continuing with low-density operations (i.e., top-handlers). As such, it may be more practical for Florida terminal operators that are anticipating growth over the coming years to explore a shift from diesel top-handlers to eRTGs.

Where there is a need to continue using top-handler equipment types, Exhibit 11 demonstrates an example cost comparison of an electric top-handler and diesel top-handler. The capital cost of an electric top-handler is likely more than twice that of a diesel model with around 40% savings in annual maintenance and energy costs for the electric unit. If the capital cost of the equipment is amortized over its lifespan (assuming 6% interest over 10 years), the annual cost (including capital, maintenance, and energy) for an electric model would be approximately 10% higher than a diesel model. This means that funding support (e.g., grant, incentive) in the amount of at least 16% of the capital cost of an electric top-handler like the one in this example would be needed to break even during the equipment's lifespan.

Exhibit 11. Diesel vs. Electric Top-Handler Costs



Top-Handler Assumptions		
Equipment lifespan	15 years for both diesel and electric models	
Annual operating time	3,000 hours for both diesel and electric models	
Costs	**Diesel Equipment**	**Electric Equipment**
Capital Cost (incl. sales tax)	$864,000	$1,836,000
Energy Use and Cost	5 gallons diesel per hour at $3.20 per gallon	70 kWh per hour at $0.12 per kWh
Maintenance cost	$30 per operating hour	$20 per operating hour [67% of diesel cost]

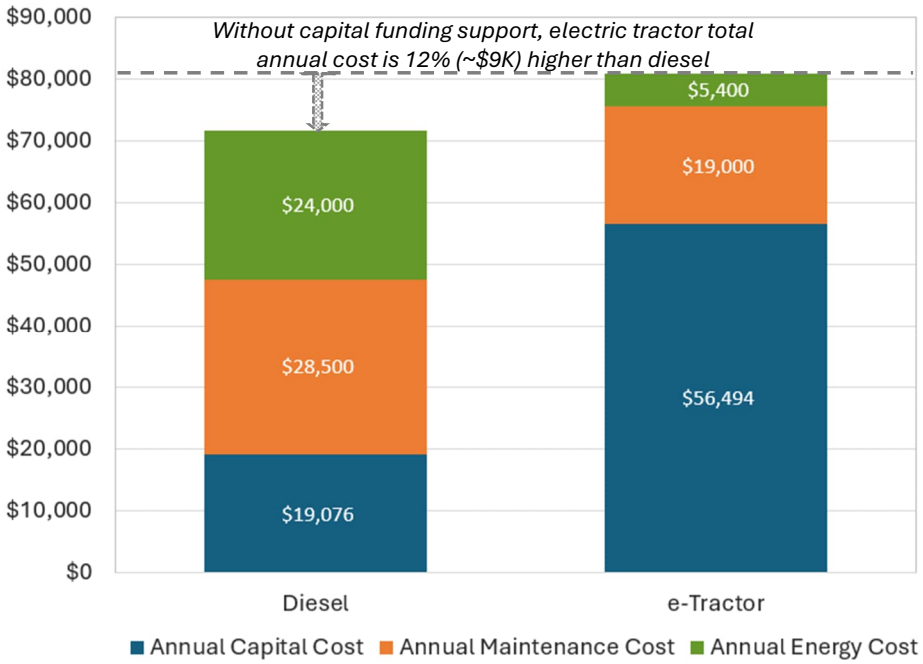
Terminal Tractors

Terminal tractors are common equipment used in container terminals, logistics centers, and rail intermodal facilities. Electric versions have become increasingly popular over the last 5-10 years, especially in lighter-duty applications such as logistics centers (e.g., UPS, and FedEx distribution centers) where they are often implemented without support from grant funding as they are already clearly cost-effective compared to diesel units in these applications.

Exhibit 12 summarizes estimated annual terminal tractor costs. Electric terminal tractors are used in numerous container terminals but have most often been grant-supported due to the heavier-duty requirements of waterfront operations, such as higher weight capacities to move loaded containers, as well as the ability to run one or two full shifts on a single charge. These more stringent requirements mean terminal tractors appropriate for container terminal operations are more expensive than lighter duty models.

While the capital cost of an electric terminal tractor is around three times that of a diesel terminal tractor, the annual maintenance and energy cost is around 50% less for an electric unit. If the capital cost of the equipment is amortized over its lifespan (assuming 6% interest over 10 years), the annual cost (including capital, maintenance, and energy) for an electric terminal tractor is estimated to be around 12% higher than that of a diesel model. This means that a grant or incentive in the amount of at least 16% of the capital cost of an electric terminal tractor would be needed for the cost to break even during the equipment's lifespan using the example provided.

Exhibit 12. Diesel vs. Electric Terminal Tractor Costs



Terminal Tractor Assumptions		
Equipment lifespan	10 years for both diesel and electric models	
Annual operating time	3,000 hours for both diesel and electric models	
Costs	**Diesel Equipment**	**Electric Equipment**
Capital Cost (incl. sales tax)	$140,000	$416,000
Energy Use and Cost	2.5 gallons diesel per hour at $3.20 per gallon	15 kWh per hour at $0.12 per kWh
Maintenance cost	$9.50 per operating hour	$6.33 per operating hour [67% of diesel cost]

Forklifts

Forklifts are used for a wide variety of cargo-handling operations in Florida, including uses at marine terminals handling containers, pallets, and other breakbulk commodities, as well as at warehouses, logistics centers, and rail facilities. Depending on the needs of each facility, the lift capacity and commensurate cost of a forklift can vary significantly. Electric forklifts have become increasingly common for lighter duty uses (e.g., 3,000 lbs) such as at warehouses and logistics centers and are routinely purchased for these applications due to their proven cost-effectiveness. However, higher-capacity forklifts, as are commonly used in cargo handling operations at ports (e.g., 40,000-80,000 lbs), are still often supported by grant applications due to their higher power requirements yielding higher costs for electric operations.

Exhibit 13. Diesel vs. Electric Forklift Costs

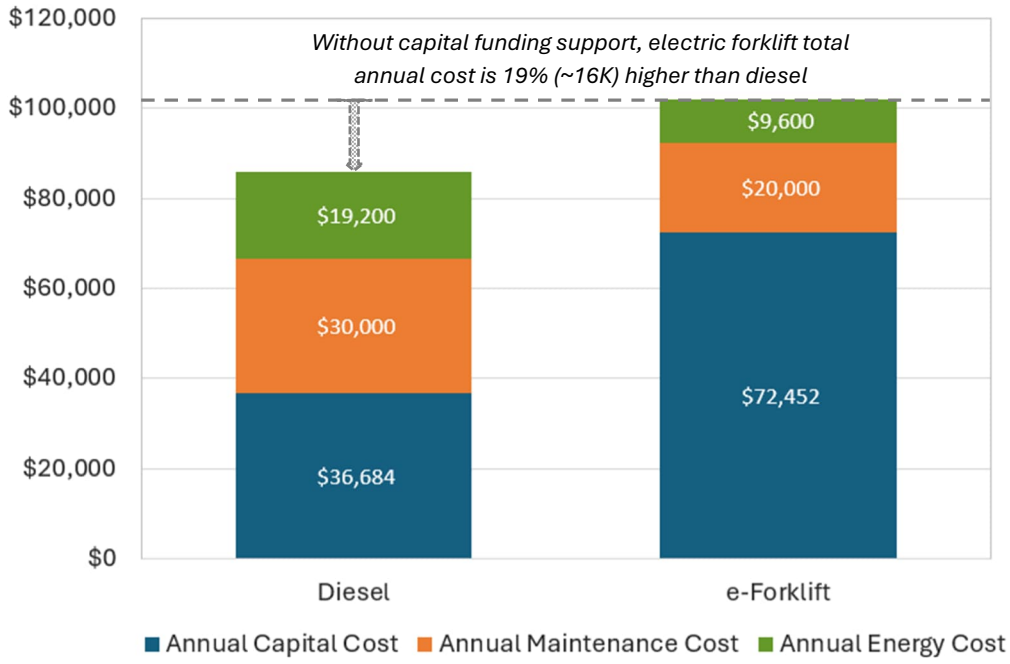


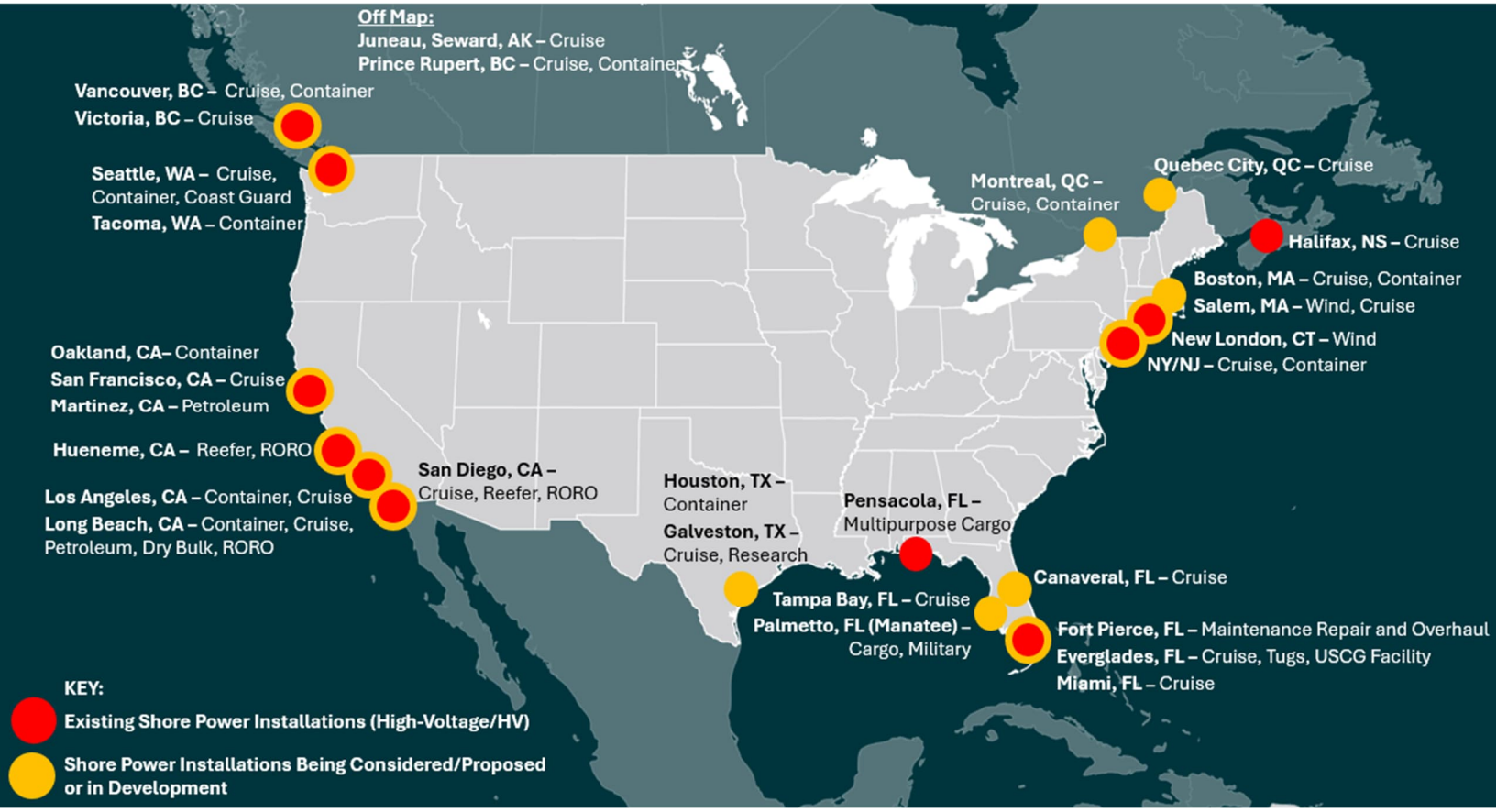
Exhibit 13 demonstrates that although the initial purchase (i.e., capital) cost of an electric forklift is around twice that of a diesel forklift, the annual maintenance and energy cost of an electric forklift could be around 40% less than a diesel forklift, with the added benefit of eliminating ground-level emissions from forklift use. If the capital cost of the equipment is amortized over its 10-year lifespan (assuming 6% interest over 10 years), the annual cost (including capital, maintenance, and energy) for an electric forklift is estimated to be around 19% higher than that of a diesel model. This means that a grant or incentive in the amount of at least 20-25% of the purchase price of an electric forklift would be needed for the cost to break even during the equipment's lifespan.

Forklift Assumptions		
Equipment lifespan	10 years for both diesel and electric models	
Annual operating time	2,000 hours for both diesel and electric models	
Costs	**Diesel Equipment**	**Electric Equipment**
Capital Cost (incl. sales tax)	$294,000	$533,250
Energy Use and Cost	3 gallons diesel per hour at $3.20 per gallon	40 kWh per hour at $0.12 per kWh
Maintenance cost	$15 per operating hour	$10 per operating hour [67% of diesel cost]

Shore Power

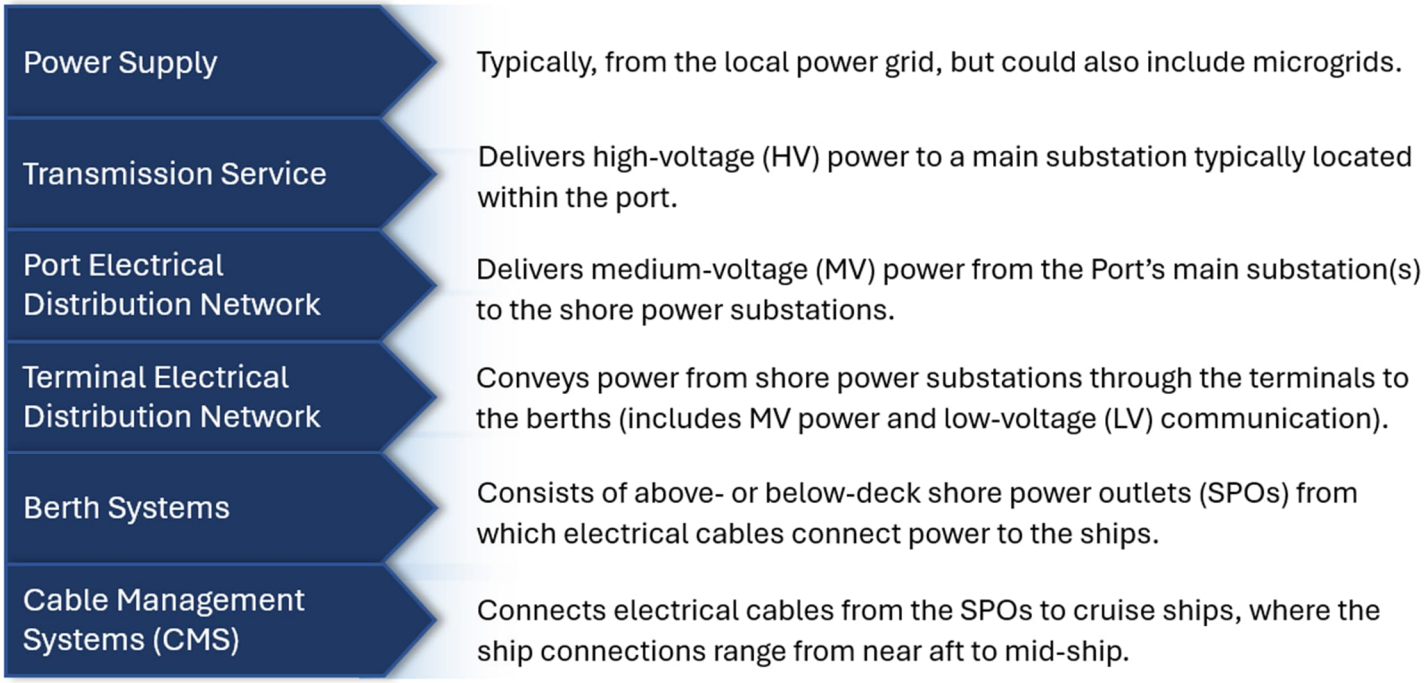
Shore power installation is a substantial long-term capital improvement for ports requiring considerable investment and buy-in. Although most of the shore power installations in the U.S. since the mid-2000's have been at container berths, the cruise industry is currently at the forefront of expanding shore power to other ports throughout the U.S. (and world). North American ports with active high voltage shore power installations, as well as those where shore power is being considered, as of 2025 are shown in Exhibit 14 below. While there are also low-voltage shore power installations across the US, including Florida's Fort Pierce, Exhibit 14 displays the high-voltage systems.

Exhibit 14. Existing and Planned High Voltage Shore Power Installations in North America, 2025



Major Infrastructure Needs

The foundation of shore power systems is its ability for a port to deliver a reliable and sufficient power supply to berthed vessels. For context, the primary components of shore power systems include:



Utility Coordination is Critical

Ports that have implemented shore power systems have a resounding message: **utility coordination is critical.** Evaluating the feasibility of a shore power project begins with a thorough understanding of the power supply needed to provide electric power to berthed ships. Cruise ships have significant energy demands, often requiring power levels comparable to small towns, with most large cruise ships having a power (hoteling) load ranging from 8 MW to 11 MW. The power load for container ships generally ranges from 3 MW to 5 MW. The electrical distribution network transfers electricity from the substation to the berths. Existing substations at ports may require upgrades to increase transformer capacity to step down high-voltage power to medium voltage levels suitable for ship connections.

Early and frequent collaboration with local utility providers is essential to confirm that the grid can handle the increased load without destabilizing local power systems. This seems obvious, but what makes utility engagement and collaboration essential to the shore power planning process is that no port is like another. Customization of the supporting energy infrastructure system to meet the individual needs of the specific port is the backbone of shore power implementation. The upgraded distribution system must be designed for safety, reliability, resilience, and operational efficiency for added redundancy, such as to support uninterrupted power supply during maintenance or peak demand periods. Underground duct bank systems are preferred over overhead lines to minimize visual and physical obstructions, reduce exposure to environmental damage, and enhance safety. These systems typically include conduits for power cables, communication lines, and fiber optics for real-time monitoring and control.

Future-Proofing and Adaptability

As maritime technology evolves, shore power systems must be designed with scalability and adaptability such that the infrastructure remains relevant and effective over its operational lifespan. This could mean implementing:

- Modular components, such as plug-and-play transformers and switchgear, allow ports to expand their systems incrementally as demand grows.
- Off-grid and/or behind-the-meter alternative power sources (i.e., microgrids) to provide added reliability and redundancy to grid power.
- Battery storage systems to provide backup power during grid outages, maintenance events, or peak demand periods and/or to store excess renewable energy for later use.
- Smart Grid Technology to enable real-time communication between the shore power system and the vessels, optimizing energy use and reducing waste.
- Renewable or clean energy sources like solar panels or small modular reactors (SMRs).

Implementation Cost Considerations and Trends

In general, based on previous projects, the cost for implementation of at-berth shore power systems, including supporting electrical distribution systems and shore power substation within the terminal, has ranged from as low as $10 million to as high as $35 million per berth. This wide cost range is due to the variety of needs and customization options for individual ports, such as:

- Availability and distance of a nearby power grid with capacity to support proposed shore power installations,
- Total substations needed and whether new electrical distribution systems are required,
- Availability and cost of key electrical equipment (e.g., transformers) and other critical needs such as cable management systems (primarily for cruise), and
- The extent of on-port existing infrastructure, utilities, and facilities that will support and/or impact installation of shore power systems, and equipment and the extent of repairs or upgrades required.

Most, if not all, shore power systems installed across the U.S. have had to address one or more of the above challenges and each of the above items will impact implementation costs. There can be economies of scale realized with shore power installation projects (i.e., it will cost less per berth with shore power installed at multiple berths as part of the same project). Cruise shore power will cost more than for containers, as cable management systems are necessary to support connecting to a wide range of ship classes. Likewise, these costs can escalate if a new port-wide power distribution system is required and/or alternative sources of power are required (if the grid does not have capacity).

Exhibit 15 below provides a summary of the shore power programs or studies at Florida's major cruise ports and program cost magnitude for context.

Exhibit 15. Florida's Major Shore Power Programs

Port	Program Description	Program Cost & Funding
Port Miami	Shore power installation at 5 berths	$130 million [$2M federal DERA grant / $16M award from FDOT]
Port Everglades	Procuring engineering design services for 14 berths	Estimated $150-$160 million [$2.5M federal DERA grant / $850K federal CPF]
Port Canaveral	Royal Caribbean Cruise Line conducted a feasibility study for shore power at all 6 existing cruise terminals and berths	Estimated $150-$160 million

As evident from the costs above, the return-on-investment (ROI) of shore power projects has not been a driver of shore power adoption. Rather, the key goals of shore power projects are competitiveness and to reduce the significant at-berth emissions and support air quality improvements and/or sustainability initiatives, goals, or programs (locally and/or globally). Without the ability to achieve ROI, shore power projects have almost always been supported by grant funding and/or usage/connection fees from the shipping and cruise lines. However, moving forward, competitiveness may become more of a driver to implement shore power irrespective of the costs for implementation. For example, Port Everglades is moving forward with their cruise shore power program, which will align with their sustainability and emissions reductions goals, meet the needs of their cruise line partners, and maintain competitiveness with PortMiami, which now has active shore power systems at five cruise terminals.

Moving forward, with a potential absence of grant funding programs for shore power, there may be a need to identify potential ROI opportunities. There are already potential shore power programs that are to be implemented by private third parties that are looking for ROI from expenditures for implementation of shore power. As an example, a third-party entity is currently working with the Port of Galveston in Texas to develop a shore power program for their four cruise terminals, with the goals of reducing emissions, providing power at a reasonable cost to their cruise line partners, and generating revenue for project ROI. The shipping and cruise lines are likely to have an increased appetite for shore power if the cost of power is relatively reasonable and the power source is reliable and avoids peak usage rates (i.e., alternative power solutions (to the grid) and/or battery storage to offset usage during peak times).

Integrating Shore Power and Alternative Fuels

Various shipping and cruise lines are considering the use of cleaner and even zero-carbon fuel alternatives to diesel. Alternative ship fuels are being implemented today, with new ship builds looking to use LNG and e-methanol. Hydrogen and ammonia fuel cells are also being considered and developed for smaller vessels, such as tugs, ferries, and barges; however, fuel cell technology is not yet capable of powering larger ships cost-effectively. It is anticipated that the cruise lines will continue to rely on the use of onboard emission reduction methods and look to increasingly use alternatives fuels to power their vessels, as long as these alternative fuels are available (which are limited today) and there are fuel bunkering sources in proximity (e.g., Port Everglades). However, the only existing solution for eliminating emissions at-berth from vessels using alternative fuels is shore power.

New, larger ships being built for alternative fuels are expected to be powered with dual-fuel engines, given that starting the engines and powering ships at berth requires the use of diesel/heavy fuel oil (HFO). Within the open ocean, these ships could operate off the alternative fuel (LNG or e-methanol); however, within port where there are speed restrictions, these ships could then utilize diesel (or HFO). Therefore, shore power could still be used for alternative ships fuels while at berth if reduction/elimination of emissions are required.

Funding Port Electrification

Public funding is the most typical mechanism for upgrading port infrastructure and technology, including port electrification initiatives, often using a blend of federal, state, local, and private sources and leveraging grant programs designed to accelerate clean energy transitions in transportation. Ports also rely on public-private partnerships, utility investment in grid upgrades, and direct capital contributions from terminal operators who see electrification as a competitive advantage and/or necessary investment. Together, these funding streams have enabled U.S. ports to pilot and scale projects such as shore power for vessels, charging infrastructure for drayage trucks, and fully electric cranes and yard equipment, creating replicable models for other ports nationwide.

Despite the shifts in current U.S. national policy, there remains a strong global impetus and even continuation of U.S.-based programs for port electrification, owing to the benefits of efficiency gains, enhanced energy resiliency, and air emissions reductions that benefit the local communities.[26]

The possible funding opportunities discussed below present a mix of potential federal grant (general and port-specific) funding and loan-related opportunities. All grant funding opportunities discussed herein are both uncertain and possibly temporary and remain contingent upon their continued alignment with evolving federal and state policy agendas.

State and Local Support

State and local sources could continue to be solutions for funding. In Florida, the Department of Transportation (FDOT) and Department of Environmental Protection (FDEP) have and continue to provide funding for port development projects. Funding from these agencies could potentially be used for some of the associated infrastructure needs and upgrades, such as new/improved electrical distribution systems and berth structures repairs and rehabilitation for improved operations and resilience within the port. FDEP, for example, continues to provide funding for resilience improvements; as previously noted, marine terminal electrification is increasingly becoming a significant component of port resiliency.

Recent Trends in Federal Funding

Historically, federal administration transitions bring significant shifts in policy priorities, which in turn influence how federal funding is allocated and awarded. The transition in January 2025 is no exception and is even amplified due to the ending of many programs under the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA), two of the most substantial infrastructure investments in US history. There have been several key policy shifts that have been made public thus far. These early signals can be used to help guide the funding strategy and help reprioritize and scope projects to be better aligned with federal priorities.

[26] Identec Solutions, Green Ports Initiative: How Smarter Operations Drive Sustainability, https://www.identecsolutions.com/news/green-ports-initiative-how-smarter-operations-drive-sustainability

Environment, Climate, and Electric Vehicles

Recent executive actions and Public Law 119-21 (often referred to as the *One Big Beautiful Bill Act*), reflect a shift in federal funding priorities for the current federal administration, with reduced emphasis on the climate-focused impacts of projects. Even so, projects that receive funding support due to financial, operational, and modernization benefits may inherently also have positive climate impacts. Marine terminal projects that incorporate equipment electrification should be positioned primarily as modernization investments – particularly when electrification improves operational efficiency, increase throughput, reduces downtime, or expands terminal capacity. Where full electrification is not immediately feasible, the acquisition of hybrid or low carbon-fueled equipment (such as propane fueled forklifts) can serve as a cost effective, transitional step that still delivers performance and operational benefits.

Similarly, projects that include asset resilience, stormwater management, green infrastructure, or wetland construction should be framed around their economic, safety, and operational co-benefits when pursuing federal funding. Emphasizing outcomes such as reduced disruption from extreme weather, lower maintenance costs, improved worker safety, and long-term asset protection can strengthen competitiveness, even where environmental outcomes are not the primary funding focus.

Programs related to EVs such as the purchasing of EVs or implementation of EV infrastructure have been rescinded and specifically targeted for pause. Direct-pay credits for EV purchases are no longer available as of September 2025 and EV charging infrastructure funding is under review with no formal update.

Updated Benefit-Cost Analysis Guidance

A Benefit-Cost Analysis (BCA) is an economic framework to evaluate competitive projects by assessing and comparing their positive and negative outcomes. BCAs quantify a project's benefit-cost ratio, which is a key factor in funding decisions for many of the larger competitive USDOT grant programs. USDOT's BCA guidance was most recently updated in December 2025 to update values and assumptions used. Fully understanding, defining, and strategically presenting the components of a project using the updated guidance can have meaningful impacts on a project's competitiveness when pursuing federal funding. To effectively position a project for federal support, it is essential to stay current with the latest BCA guidance and align with the administration's prevailing priorities.

Transportation Infrastructure

The USDOT has released initiatives, memos, letters, and statements indicating that it will begin prioritizing highway, freight, and safety projects, while deprioritizing active transportation and transit projects. Notably, there has been specific language around prioritizing funding for truck parking and freight related projects. This shift is favorable for projects that are pursuing federal funding.

Program Consolidation

While few changes have occurred so far, the current U.S. administration has recommended the consolidation of federal funding programs. Although a potential decrease in overall discretionary funding is expected, the current administration's "skinny budget" incorporates funding increases for Infrastructure for Rebuilding America (INFRA), Consolidated Rail Infrastructure and Safety

Improvements (CRISI), Better Utilizing Investments to Leverage Development (BUILD), and Port Infrastructure Development Program (PIDP). Separately, these discretionary funds could move towards formula programs, allowing the states to more directly control their spending.

Private Investment and TIFIA

The USDOT has made several moves this year which indicate their focus on expanding private investments and the use of the Transportation Infrastructure Finance and Innovation Act (TIFIA) in transportation projects. The USDOT has expanded TIFIA to allow loan coverage to support up to 49% of the total cost of a project, a 13% increase. Separately, they are continuing to support and fund programs and projects that promote private investment, public-private partnerships (P3), and other innovative and non-traditional financing methods. Increasingly, private third parties are entering the port sector with a focus on supporting and even leading port electrification programs. This is particularly the case where there are opportunities to implement and operate independent power solutions, either as stand-alone power sources or connected to the grid behind-the-meter, that provide revenue (and return on investment) opportunities. These third parties are looking to enter into agreements with the local port authorities to develop power alternatives that increase power capacity and reliability, and support and provide funding for local port electrification and emissions reductions initiatives.

Competitive Grant Opportunities

Ports can (and do) apply for competitive federal grants to fund portions of their projects or initiatives. Competitive grants are merit-based programs where the awarding agency reviews the submitted applications and awards the project that is deemed to best meet the program goals. With some competitive federal grants, a port would need to submit through an eligible partner. Some of these programs are funded through FY26 from the IIJA and IRA, while others need reauthorization before awarding funding.

Ports are also increasingly partnering with their tenants for these grant applications, which show contributions from the private industry that will pilot-test or fully implement the resulting electrification initiatives, thereby improving the competitiveness of the applications. This has become more important as multiple ports across the U.S. are competing for funding from the same programs, which have funding caps. A recent example is JAXPORT's Exemplifying Potential to Reduce Emissions with Sustainable Solutions (EXPRESS) project. The JAXPORT EXPRESS project is a $47 million public-private partnership between JAXPORT, SSA Atlantic, and Crowley. The funding will advance sustainability efforts at the Blount Island and Talleyrand terminals by introducing some of Florida's first large-scale zero- and near-zero-emission cargo-handling technologies. The project aims to reduce greenhouse gas emissions, upgrade energy-efficient terminal infrastructure, increase cargo capacity, and create a long-term plan for transitioning port operations to lower-emission systems.[27]

[27] JaxPort, *Federal Government Awards JAXPORT $23.5 million for Port Sustainability Initiatives*, (October 2022), https://www.jaxport.com/federal-government-awards-jaxport-23-5-million-for-port-sustainability-initiatives/

Port-Specific and Clean Energy Grant Funding

This section details the following seven programs identified for port-specific and/or clean energy funding.

- Port Infrastructure Development Program (PIDP)
- Diesel Emissions Reductions Act (DERA)
- Reduction of Truck Emissions at Port Facilities
- United States Marine Highway Program (USMHP)
- Credit for Qualified Commercial Clean Vehicles (IRC §45W)
- Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)
- Advanced Transportation Technologies and Innovation (ATTAIN)

There is bipartisan support for the port sector, evidenced by both Republican and Democratic administrations having supported discretionary funding programs for ports, and it is reasonable to expect that these programs will continue. For example, the PIDP Program was initiated under President Trump's first administration in 2019 and continued and subsequently expanded under the IIJA Legislation though to 2024. The most recent Notice of Funding Opportunity (NOFO) was released under President Trump's second administration in January 2025.

Port Infrastructure Development Program (PIDP)

PIDP assists in funding eligible projects for the purpose of improving the safety, efficiency, or reliability of the movement of goods through ports and intermodal connections to ports. Created in 2010, PIDP has typically been reauthorized with varying funding levels.

Issuing Agency	Maritime Administration, U.S. Department of Transportation
Port-Relevant Applicant Eligibility Criteria	• A State; • A political subdivision of a State, or a local government; • A public agency or publicly chartered authority established by 1 or more States; • A special purpose district with a transportation function; • A multistate or multijurisdictional group of entities described above; • A lead entity described above jointly with a private entity or group of private entities, including the owners or operators of a facility, or collection of facilities at a port.
Funding Cycle	Yearly (through FY 26). Applications for the latest round were due September 10, 2025.
Project Eligibility	Eligible projects for FY 2025 PIDP shall be located either within the boundary of a port, or outside the boundary of a port and directly related to port operations or to an intermodal connection to a port. Grants may be made for capital projects that will be used to improve the safety, efficiency, or reliability of: • The loading and unloading of goods at the port, such as for marine terminal equipment; • The movement of goods into, out of, around, or within a port, such as for highway or rail infrastructure, intermodal facilities, freight intelligent transportation systems, and digital infrastructure systems; • Operational improvements, including projects to improve port resilience; • Resiliency in response to environmental factors; or • Infrastructure that supports seafood and seafood-related businesses.
Cost Share	Max 80% Federal and may increase for projects in a rural area or for a small project at a small port.
Estimated Program Funding	Total Funding available (FY 2025): $500 million
Average Past Award	FY 2023: $653 million awarded to 41 port projects (average $16 million per port). Of the total, 26 small port grant awards and 15 for large ports.

Diesel Emissions Reductions Act (DERA)

The program funds projects that achieve significant reductions in diesel emissions and exposure, particularly from fleets operating in areas designated by the Administrator as poor air quality areas.

Issuing Agency	U.S. Environmental Protection Agency
Port-Relevant Applicant Eligibility Criteria	• A regional, state, or local agency • Port authorities which have jurisdiction over transportation or air quality
Deadline/Funding Cycle	Last advertised deadline date posted by Florida Department of Environmental Protection (State- Pass Through Entity) was March 16, 2021. Last competitive grant at the national level via EPA was offered in FY 2022 – 2023 and closed in December 2023.
Project Eligibility	Eligible diesel vehicles, engines, and equipment may include buses, Class 5 – Class 8 heavy-duty highway vehicles, marine engines, locomotives and nonroad engines, equipment or vehicles such as those used in construction, handling of cargo, agriculture, mining or energy production. Eligible diesel emissions reduction solutions include verified retrofit technologies such as exhaust after-treatment technologies, engine upgrades, and cleaner fuels and additives, verified idle reduction technologies, verified aerodynamic technologies, verified low rolling resistance tires, certified engine replacements and conversions, and certified vehicle or equipment replacement.
Match Requirement	Mandatory non-federal cost share varies based on the eligible technologies, ranging between 0% to 75%. Examples include: • For EPA Verified Marine Shore Connection Systems, the local mandatory cost share is 75%; • Drayage Truck Replacement (50%); • Vehicle or Equipment Replacement with Zero-tailpipe Emission Power Source (55%).
Estimated Program Funding	Total Funding: Approx. $50-60 million ($46 million in discretionary awards in 2021)
Average Past Award	2022-2023: awards ranged from $34,000 to $6.2 million

Reduction of Truck Emissions at Port Facilities

Reduction of Truck Emissions at Port Facilities program will award competitive grants to coordinate and provide funding to test, evaluate, and deploy projects 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.

Issuing Agency	Federal Highway Administration, U.S. Department of Transportation
Port-Relevant Applicant Eligibility Criteria	• State Governments; • Local Governments; • Planning and Project Organizations; • Transportation Providers and Operators; • Private-Sector Applicants • Including entities that 1) have authority over, operate, or utilize port facilities and/or intermodal port transfer facilities, 2) have authority over areas within or adjacent to ports and intermodal port transfer facilities, or 3) will test and/or evaluate technologies that reduce truck emissions at port facilities and/or intermodal port transfer facilities.
Deadline/Funding Cycle	Applications for the most recent round FY 2023 were due July 26, 2023 (Funding available until FY 2026)
Project Eligibility	This program explicitly aims to reduce port-related emissions from idling trucks, including through the advancement of port electrification and improvements in efficiency. Eligible project locations for deployment projects include areas within or adjacent to ports and intermodal port transfer facilities. Testing and evaluation projects can be conducted anywhere but must be focused on reducing truck emissions within or adjacent to ports and/or intermodal port transfer facilities.
Cost Match	80% Federal match
Estimated Program Funding	Total Funding: $160 million
Average Past Award	Past awards ranged from $642,258 to $34.8 million

U.S. Marine Highway Program (USMHP)

The USMHP provides funding support to Marine Highway Transportation Projects or components of Projects that: 1) provide a coordinated and capable alternative to landside transportation; mitigate or relieve landside congestion; promote Marine Highway Transportation; or use vessels documented under 46 U.S.C. chapter 121; and 2) develop, expand, or promote Marine Highway Transportation or shipper use of Marine Highway Transportation.

Issuing Agency	Maritime Administration, U.S. Department of Transportation
Port-Relevant Applicant Eligibility Criteria	• State • Political subdivision of a State or a local government • United States metropolitan planning organization • United States port authority • United States private sector operator of Marine Highway Projects or private sector owners of facilities
Deadline/Funding Cycle	Applications for the most recent round FY 2025 were due July 15, 2025 (Funding available until FY 2026)
Project Eligibility	Eligible Projects may be either capital Projects, development phase, or Marine Highway Transportation Planning Activities. Eligible Project activities include Projects or components of Projects that 1) provide a coordinated and capable alternative to landside transportation; mitigate or relieve landside congestion; promote Marine Highway Transportation; or use vessels documented under 46 U.S.C. chapter 121; and 2) develop, expand, or promote Marine Highway Transportation or shipper use of Marine Highway Transportation.
Cost Match	80% Federal match
Estimated Program Funding	Total program funding in 2025 was $14.0M
Average Past Award	Awards ranged from $277,766 to $3.3 million in Fiscal Years 2023 and 2024.

Promoting Resilient Operations for Transformative, Efficient, and Cost-Saving Transportation (PROTECT)

Resilience improvement grants funds eligible activities that will improve the ability of an existing surface transportation asset to withstand one or more elements of a weather event or natural disaster, or to increase the resilience of surface transportation infrastructure from the impacts of changing conditions, such as sea level rise, flooding, wildfires, extreme weather events, and other natural disasters.

Issuing Agency	USDOT Federal Highway Administration
Port-Relevant Applicant Eligibility Criteria	The PROTECT Discretionary Grant Program provides broad applicant eligibility for all levels of government, including Port Authorities, to be direct recipients of funds.
Deadline/Funding Cycle	Applications for the most recent round FY 2025 were due February 2025 (Funding available until FY 2026)
Project Eligibility	There are several PROTECT sub-programs: • Resilience Improvement Grants – for standard resilience projects. • Community Resilience and Evacuation Routes – for the resilience of evacuation routes. • Planning Grants – for the planning of resilience projects. • Coastal Projects
Cost Match	80% Federal match
Estimated Program Funding	Total FY25 program funding and award ceiling: $876 million Award floor: $100,000

Advanced Transportation Technologies and Innovation (ATTAIN)

Competitive grants to deploy, install, and operate advanced transportation technologies to improve safety, mobility, efficiency, system performance, intermodal connectivity, and infrastructure return on investment.

Issuing Agency	USDOT Federal Highway Administration
Port-Relevant Applicant Eligibility Criteria	Eligible applicants are State or local governments, transit agencies, metropolitan planning organizations (MPO), or other political subdivisions of a State or local government (such as publicly owned toll or port authorities), or a multijurisdictional group or consortia of research institutions or academic institutions.
Deadline/Funding Cycle	FY25-FY26 NOFO is scheduled for release by the 1st quarter of CY 2026.
Project Eligibility	Grant recipients may use funds under this program to deploy the following advanced transportation and congestion management technologies: • Advanced traveler information systems; • Advanced transportation management technologies; • Advanced transportation technologies to improve emergency evacuation and responses by federal, state, and local authorities; • Infrastructure maintenance, monitoring, and condition assessment; • Advanced public transportation systems; • Transportation system performance data collection, analysis, and dissemination systems; • Advanced safety systems, including V2V and V2I communications, technologies associated with automated vehicles, and other collision avoidance technologies, including systems using cellular technology; • Integration of intelligent transportation systems with the smart grid and other energy distribution and charging systems; • Integrated corridor management systems; • Advanced parking reservation or variable pricing systems or systems to assist trucks in locating available truck parking; • Electronic pricing, toll collection, and payment systems; • Technology that enhances high-occupancy-vehicle toll lanes, cordon pricing, or congestion pricing; • Integration of transportation service payment systems; • Advanced mobility access and on-demand transportation service technologies, such as dynamic ridesharing and information systems to support human services for elderly and disabled individuals; • Retrofitting dedicated short-range communications (DSRC) technology deployed as part of an existing pilot program to cellular vehicle-to-everything (C-V2X) technology, subject to the condition that the retrofitted technology operates only within the existing spectrum allocations for connected vehicle systems; or • Advanced transportation technologies, in accordance with the research areas described in section 6503 of Title 491.
Cost Match	80% Federal match
Estimated Program Funding	Total FY23-FY24 program funding: $120 million Award ceiling: $12 million
Average Past Award	FY23-FY24 award range: $551,732 to $10.6 million

General Infrastructure Grant Opportunities

The following two grant opportunities described in this section are awarded on a competitive basis to surface transportation infrastructure projects.

- Multimodal Project Discretionary Grant (MPDG)
- Better Utilizing Investments to Leverage Development (BUILD)

Multimodal Project Discretionary Grant (MPDG)

The MPDG opportunity contains three grant programs: the National Infrastructure Project Assistance grants program (Mega), the Nationally Significant Multimodal Freight and Highway Projects grants program (INFRA), and the Rural Surface Transportation Grant program (Rural)*. The funding opportunities are awarded on a competitive basis for surface transportation infrastructure projects – including highway and bridge, marine highway, and freight projects, or groups of such projects – with significant national or regional impact.

[**Most ports would not be eligible to apply to the Rural program, as they must reside outside of urbanized areas with a population of over 200,000. Populations above 200,000 will not be considered rural.]*

Issuing Agency	Office of the Secretary, U.S. Department of Transportation
Port-Relevant Applicant Eligibility Criteria	• A State or a group of States; • A unit of local government or a political subdivision of a State; • A special purpose district or public authority with a transportation function, including a port authority; • A partnership between Amtrak and 1 or more entities described above; • A group of entities described above;
Deadline/Funding Cycle	For the latest round of funding, applications were due on May 6, 2024. Yearly (through FY 26); additional funding cycles are uncertain as all awards under IIJA have been made. The program will need reauthorization to continue.
Port-Related Project Eligibility	• A freight intermodal (including public ports) or freight rail project that provides public benefit; • A surface transportation project within the boundaries or functionally connected to an international border crossing that improves a facility owned by Fed/State/local government and increases throughput efficiency; • A project for a marine highway corridor that is functionally connected to the NHFN and is likely to reduce road mobile source emissions; • A highway, bridge, or freight project on the National Multimodal Freight Network; • A project on a publicly-owned highway or bridge that provides or increases access to an agricultural, commercial, energy, or intermodal facility that supports the economy of a rural area
Cost Share	Max 80% Federal for MEGA and INFRA
Estimated Program Funding	INFRA: $2.7 billion total funding; $2.27 billion award ceiling; $5 million award floor Mega: $1.7 billion total funding; $1 billion award ceiling

Better Utilizing Investments to Leverage Development (BUILD)

The Better Utilizing Investments to Leverage Development (BUILD) grant program provides grants for surface transportation infrastructure projects with significant local or regional impact. The eligibility requirements of BUILD allow project sponsors to pursue multi-modal and multi-jurisdictional projects that are more difficult to fund through other grant programs.

Issuing Agency	U.S. Department of Transportation
Port-Relevant Applicant Eligibility Criteria	• States and the District of Columbia; • Any territory or possession of the United States; • A unit of local government; • A public agency or publicly chartered authority established by one or more States; • A special purpose district or public authority with a transportation function, including a port authority; • A multi-State or multijurisdictional group of entities that are separately eligible
Deadline/Funding Cycle	Applications for the final round under IIJA are due February 2026.
Project Eligibility	Planning and/or constructing surface transportation infrastructure
Cost Share	Max 80% Urban/Rural (based on FY 2026 NOFO)
Estimated Program Funding	• The Department considered 195 FY 2024 Projects of Merit requesting nearly $2.4 billion under Round 1.
Average Past Award	• 109 projects were awarded a total of $1.32 billion • Awards were made to projects in 37 states • Awards ranged from $160,000 to $25 million

Federal Non-Grant Financing Mechanisms

Federal non-grant financing mechanisms provide useful tools to complement traditional grant funding. These financing mechanisms extend the impact of limited federal and state grant dollars while enabling larger and more complex projects to move forward. Unlike grants, which provide one-time funding, tools like Private Activity Bonds (PABs) and Transportation Infrastructure Finance and Innovation Act (TIFIA) lower borrowing costs, improve creditworthiness, and attract private capital into public infrastructure. This not only leverages additional investment but also spreads financial risk, provides flexibility in structuring project delivery, and allows agencies to align repayment with long-term revenue streams (such as tolls, fees, or dedicated taxes).

The eligibility of ports varies with the type of financing instrument. In the case of PABs, these are issued by a public entity on behalf of a private developer/operator who then benefits from tax-exempt financing costs. However, in the case of TIFIA funding, ports can fall under the category of special authorities that own or operate transportation facilities but are not general-purpose state or local governments.

Private Activity Bonds (PABs)

PABs are tax-exempt debt instruments which offer a financing option at a lower cost than comparable taxable bonds for a range of transportation projects that are privately developed, built, financed, operated, and/or maintained utilizing P3 project delivery methods.

Issuing Agency	U.S. Department of Transportation, Build America Bureau
Qualified Facilities for which PABs can be issued	States administer PAB allocations for all listed facilities except for one category of facilities: qualified surface transportation projects, international bridge or tunnel projects, and rail-truck/truck-rail freight transfer facilities. USDOT administers PAB allocations for this category of qualified facilities. States administer their PABs allocation programs, subject to state volume caps set up by the Internal Revenue Service. Congress determines USDOT's administered PAB allocation authority cap.
Deadline/Funding Cycle	Rolling
Estimated Program Funding	Allocations (as of August 15, 2025) • Total authorized (USDOT): $30 billion • Total allocated and issued: $23.9 billion • Total allocated and yet-to-be issued: $5.0 billion • Total currently available to be allocated: $1.1 billion

Transportation Infrastructure Finance and Innovation Act (TIFIA)

The goal of the TIFIA program is to leverage limited Federal resources and stimulate capital market investment in transportation infrastructure by providing credit assistance in the form of direct loans, loan guarantees, and standby lines of credit (rather than grants) to projects of national or regional significance.

Issuing Agency	USDOT and Build America Bureau
Eligible Sponsors	State governments, state infrastructure banks, private firms, special authorities, local governments, transportation improvement districts
Deadline/Funding Cycle	Rolling
Port-Related Eligible Projects	• Intelligent Transportation Systems • Intermodal Connectors • Freight Transfer Facilities • Surface Transportation Elements of Port Projects
Minimum Anticipated Project Cost	Minimum Anticipated Project Costs: • $15 million for intelligent transportation system projects • $50 million for all other eligible non-transit-oriented surface transportation projects
Other Requirements	TIFIA Credit Assistance Limit: • Credit assistance limited to up to 49% of reasonably anticipated eligible project costs. (Revenue-backed public-private partnership projects' funding plans are required to include at least 25% in private co-investment to be eligible. Additionally, some projects may require further analysis to be eligible for financing.) Investment Grade Rating: • Senior debt and TIFIA loans must receive investment grade ratings from at least two nationally recognized credit rating agencies (only one rating required if less than $75 million) Dedicated Repayment Source: • The project must have a dedicated revenue source pledged to secure both the TIFIA and senior debt financing.