



White Paper

Port Electrification Benefits the Local Economy and Environment While Providing New Electric Load for Utilities

By Bob DiBella

Summary

Electric utilities serving water ports should seek partnerships with port authorities and their tenants to implement port electrification strategies. The U.S. EPA recently released a new report that highlights an opportunity for utilities with ports in their service territory to contribute to the environmental and economic wellbeing of their local communities.

The National Port Strategy Assessment provides an overview of emissions sources at major seaports, Great Lakes ports, and inland river ports throughout the U.S.¹ The report points out that ports are major economic engines in the surrounding communities, but are also a significant source of air pollutants due, in large part, to diesel emissions stemming from both land-side and water-side transportation and cargo handling equipment.

The EPA report outlines a strategy for improving the working and living environment in and around these ports by upgrading or replacing older diesel-powered vehicles, equipment, and ships with new clean technologies. The alternative technologies evaluated in the report include clean diesel, compressed natural gas, hybrid electric, plug-in hybrid electric, and battery electric vehicles. Importantly, electrification is the only alternative that reduces on-site emissions by nearly 100% and is in many cases the most cost-effective long term option.

By assisting in the process of port electrification, utilities serving the nation's major ports stand to gain increased sales in addition to environmental benefits and enhanced economic growth.

¹ National Port Strategy Assessment: Reducing Air Pollution and Greenhouse Gases at U.S. Ports. See: <https://www.epa.gov/ports-initiative/national-port-strategy-assessment>.





Port Emissions Reduction and Load Growth Potential

Working under contract to the EPA, ICF's Transportation and Environment team surveyed a representative sample of the 150 largest ports located in the U.S. to identify the most promising technological strategies for achieving emissions reductions goals for particulate matter (PM), nitrogen oxides (NO_x), and carbon dioxide (CO₂). The report evaluated diesel-powered vehicles and equipment in the following categories: Drayage Trucks, Rail, Cargo Handling Equipment, Harbor Craft, and Ocean Going Vessels. Electrification options are prescribed in all of these categories including a wide range of on and off-road transportation and cargo handling equipment with significant NO_x reduction and energy sales, as illustrated in the table below.

TYPICAL NO_x AND ENERGY CHARACTERISTICS OF ELECTRIC PORT TECHNOLOGIES

Technology	Typical NO _x Emissions (lbs./year)	Potential Load Impact (kWh/year)
RTG Cranes —rubber tired gantry cranes	5,400	368,000
Yard Tractors —used to move containers and chassis within a port area	1,600	78,000
Shore Power —plugging an ocean going vessel into the shore-side electricity grid	900 – 1,600 (per call)	16,000 – 68,000 (per call)
Switcher Locomotives —used for assembling and disassembling of trains and short distance hauling around a port	16,500	775,000
Forklifts —primarily used for lifting and moving heavy loads around port facilities	800	25,000

Source: National Port Strategy Assessment

What This Means to Utilities

Ports are important economic engines in the communities that surround them. These vital transportation and shipping facilities, 40% of which are located in air quality non-attainment or maintenance areas, are also concentrated sources of diesel emissions. Given that environmental sustainability and economic development are fundamentally important to the utility industry, utilities should be active stakeholders in the effort to reduce diesel emissions at the ports they serve. Beneficial electrification is a proven approach to emissions reductions. A number of utilities have already developed beneficial electrification programs and some have experienced the benefits of engaging the local port authority in this program.

This is because ports represent a significant opportunity to obtain incremental electricity sales while contributing to emissions reductions and economic development in the communities they serve. For example, CenterPoint Energy which serves Port Houston—the third busiest port in the U.S.—is achieving load growth while supporting emissions reduction efforts through its Clean Air Technologies program. The program, which promotes electrification of ship to shore cranes and forklifts, has also helped CenterPoint customers access environmental quality grant funding from the State of Texas. In Jacksonville, Florida, JEA provides support for electrification through its Non-road Electrotechnologies program, which is supporting the installation of large gantry cranes at the port in Jacksonville.

How Utilities Should Get Involved

ICF recommends that utilities follow a proven approach to developing an emissions reduction program in partnership with the ports they serve. This process should be conducted in collaboration with stakeholders representing the port authority and the tenants operating within the port.

Once buy-in with the key port stakeholders has been obtained, the next step is to assess the potential for electrification at the port. This step involves collecting information on diesel emissions source equipment and how it is operated at the port. In some cases, port authorities have already completed detailed air emissions inventories that include a full accounting of emissions source equipment. These surveys provide valuable input data for the electrification assessment.

The second step is to identify the types of equipment and end-uses that are the best candidates for electrification at the port. This step should build on the information and recommendations contained in the EPA's National Port Strategy Assessment. Accomplishing this task also requires local knowledge, interaction with port stakeholders and equipment distributors, and expertise in electric transportation and material handling technologies.

Once all of all of the potential technologies have been identified and evaluated, utilities should perform a detailed cost-benefit analysis across one or more potential program strategies. This will help the utility establish parameters—e.g. incentive levels—that will result in a cost-effective port electrification program.

Ultimately, utilities will need to structure and implement a program that includes customer outreach, trade ally engagement, technical support, engineering and service extension policies, along with financial incentives. A robust program, over time, will help transform the port through the adoption of clean electric alternatives to diesel engines.

Utilities should also evaluate opportunities to leverage funding available from government environmental agencies. Many of the strategies in this assessment are eligible for existing federal funding sources, such as EPA's Diesel Emissions Reduction Act (DERA) grant program. Furthermore, the recently approved

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Volkswagen emissions settlement has created a \$2.7 billion dollar NO_x emissions reduction fund to be managed by state agencies in all 50 states. The Volkswagen settlement agreement explicitly addresses shore power and port drayage trucks, and other vehicles and equipment commonly found in ports.

How ICF Can Help

ICF can help utilities design and deliver their own programs, can facilitate discussions with government agencies to secure grants, and can support joint efforts between utilities, ports and agencies to evaluate, design, and deliver programs. ICF has the infrastructure necessary to quickly stand-up and administer these programs, including economic analysis, technical support, account management, customer acquisition, marketing, call center, incentive processing, QA/QC, and data tracking.

ICF brings a full set of capabilities to design and implement Port emissions reduction and electrification programs, with particular expertise in diesel emission reduction opportunities. Our staff have deep technical knowledge of NO_x emission control strategies for light-duty, heavy-duty, and off-road vehicles. We have helped federal, state, local transportation and environmental agencies, and utilities with evaluating candidate control strategies to maximize the cost effectiveness of emission reduction and beneficial electrification programs.

Our staff has completed a project for the California Electric Transportation Coalition that focuses on the potential for electrifying various transportation segments including off-road transportation electrification applications such as forklifts, port equipment, cargo handling equipment, and cold ironing. ICF has also evaluated more than 60 individual electro-technologies for inclusion in utility electrification programs including: material handling equipment, marine/port equipment, airport ground support equipment, locomotives, mining equipment, agricultural equipment, industrial processes, and other applications.

About the Author



Bob Dibella has over 25 years in the energy industry as an energy auditor, project manager, consultant, and product manager. He has in-depth experience in energy engineering for utilities and their customers. Prior to joining ICF, Bob led product management and business development at Aclara Technologies where he was responsible for utility consumer engagement solutions. Bob was also a project manager at XENERGY Inc. (now DNV-GL), where he was responsible for major projects involving residential/small commercial audit programs, large C&I energy efficiency studies and development of software tools.

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