



C-PORT: The Commercialization of Port of Long Beach Off-Road Technology Demonstration Project

The C-PORT Demonstration Project brings together a diverse group of industry-leading project partners to advance the goals of the San Pedro Bay Ports Clean Air Action Plan. The Port of Long Beach, in partnership with SSA Marine and Long Beach Container Terminal (LBCT), will demonstrate five pieces of zero-emissions cargo handling equipment (CHE) at Pier E and Pier J container terminals. The demonstration will include three never-before-tested battery-electric top handlers and feature a unique, head-to-head comparison of a hydrogen fuel cell yard truck versus a battery-electric yard truck.



This demonstration project, funded by the 2016-2017 Off-Road Advanced Technology Demonstration Projects Program, will test the performance capability of pre-commercial zero-emissions CHE in one of the most challenging duty cycles. The C-PORT Demonstration Project is anticipated to reduce annual emissions by 347 MT CO₂e, 0.69 tons NO_x, 0.159 tons ROG, and 0.0212 tons diesel PM₁₀.

Dates: May 2018 – March 2020
Grantee: Port of Long Beach
Partners: Academy of Global Logistics, Air Products, BYD, CARB, CNHTC/Sinotruk, Grant Farm, Green Education, Inc., ILWU, Long Beach Container Terminal, Loop Energy, South Coast AQMD, SSA Marine, Taylor Machine Works, Tetra Tech, and UQM Technologies.

Grant Amount:
 CARB Contribution: \$5,339,820
 Matching Funds: \$2,963,550
 Project Total: \$8,303,370



Vehicles/Equipment Funded

Three battery-electric top handlers developed by Taylor Machine Works and BYD:

- 931 kWh LiFePO₄ battery pack
- One 200 kW BYD charging station per top handler
- Deploying one at Pier E and two at Pier J

One battery-electric yard truck developed by Kalmar Global and Transpower:

- 154 kWh LiFePO₄ battery pack
- 70 kW charging station
- Deploying at Pier E

One hydrogen fuel cell yard truck developed by LOOP Energy and the China National Heavy Duty Truck Group Co. (CNHTC):

- 56 kW proton exchange membrane (PEM) fuel cell
- Utilizing an Air Products mobile fueling station
- Deploying at Pier E

Lessons Learned

- OEMs offering pre-commercial equipment should study industry-specific requirements and duty cycles to effectively incorporate into prototypes.
- All partners should be brought to the table early to ensure efficient design and development; technology providers, OEMs, engineers, terminals, and the workforce.
- Deploying charging infrastructure at active terminals requires creative solutions and long lead times.

Status Updates

- First piece of zero-emissions CHE expected to be deployed in April 2019 at Pier E, LBCT.
- First charging station will be tested, commissioned and UL certified in April 2019.
- All construction work is expected to be completed by May 2019.

