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Analytic Framework for Optimal Sizing of Hydrogen Fueling Stations for Heavy Duty Vehicles at Ports

CRADA 512

April 2021

Kevin P. Schneider

Seattle City Light

Sandia National Laboratory

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Abstract

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Pacific Northwest National Laboratory
Richland, Washington 99354

Abstract

This CRADA presents the strategy that PNNL and Sandia National Laboratories (SNL) will take to support Seattle City Light (SCL) in properly sizing a hydrogen station for class 8 drayage trucks at the Port of Seattle (Port), as part of a coordinated plan of mixed uses for hydrogen. The proper sizing for the fueling station is unique from past experiences because it will be part of a coordinated plan for a multi-use scheme for the hydrogen, and not a stand-alone fueling station. The multiple use-streams, and their relative values, will impact all facets of station sizing and design, including fueling rates, storage technology and size, equipment selection, and safety considerations.

The future deployment of this fueling station, and its proper sizing, is seen as a critical first step in the larger vision of utilizing hydrogen to address a range of issues for SCL and the Port. These include, but are not limited to, large scale fueling of medium duty (MD) and heavy duty (HD) vehicles to reduce emissions, support of adjacent light duty (LD) vehicles, support of critical port operation during extreme events (e.g. resiliency), mitigation of capital intensive electrical distribution system upgrades to support evolving port operations, a market resource that can be used by SCL to generate revenue, and support of planned future maritime operations that currently require heavy use of shipboard hydrogen.

While the broader use of hydrogen by SCL and the Port is not the focus of this CRADA, how its use impacts the design of the initial vehicle fueling station, and the modular approach, are the central work. As such, this project will develop the framework and process for developing a modular station design that considers the broader range of coordinate uses of hydrogen as an energy resource.

Pacific Northwest National Laboratory

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99354
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