



SHORE POWER

PROJECT BACKGROUND

The NorthWest Seaport Alliance (NWSA) has identified the Port of Seattle's Terminal 18 (T-18) facility as a key opportunity towards phasing out emissions from seaport activities by 2050. Ocean Going Vessels (OGVs) are the largest source of both diesel particulate matter and greenhouse gas (GHG) emissions associated with NWSA harbors. The provision of Shore Power through a grid-connecting power cable to an OGV provides a cheaper, cleaner option to provide much of the energy requirements while docked.

PROJECT DESCRIPTION

Located on Harbor Island at the mouth of the Duwamish Waterway, the T-18 census tract and neighboring communities are all identified as 10 out of 10 in Diesel Pollution Burden based on the Environmental Health Disparities Map.² This project will include the power distribution elements required to bring electricity from the customer-side substation to connection points on the dock for ships to power from the electric grid.

With design and construction costs approaching \$30 million, the T-18 shore power project is assumed to last 30 years without significant maintenance needs. Currently, half of vessel calls at T-18 are shore power-capable. This case study assumes fuel cost savings and increasing availability of and regulations requiring shore power at other ports creates increased demand for shore power at T-18. Shore power-capable calls are assumed to account for 86% of dockings after 30 years, an increase of 5 shore power-capable calls per year. The average shore power demand is 34.7 MWh per call, avoiding 23.7 tCO₂e in diesel emissions by substituting near-zero emissions electricity from Seattle City Light. The OGV diesel engines in use are assumed to get cleaner over time, progressing from mainly Tier 0 through Tier 2 engines to 80% Tier 3 engines in the last year of the project.

CASE STUDY RESULTS

Timeframe

30 years

Public Health Benefits

\$250 / tCO₂e emitted

Cumulative Avoided Emissions

0.19 million tCO₂e

Cumulative Public Health and Climate Benefits, NPV

\$33 million

Total Costs, NPV

\$8.9 million

Abatement Cost, NPV

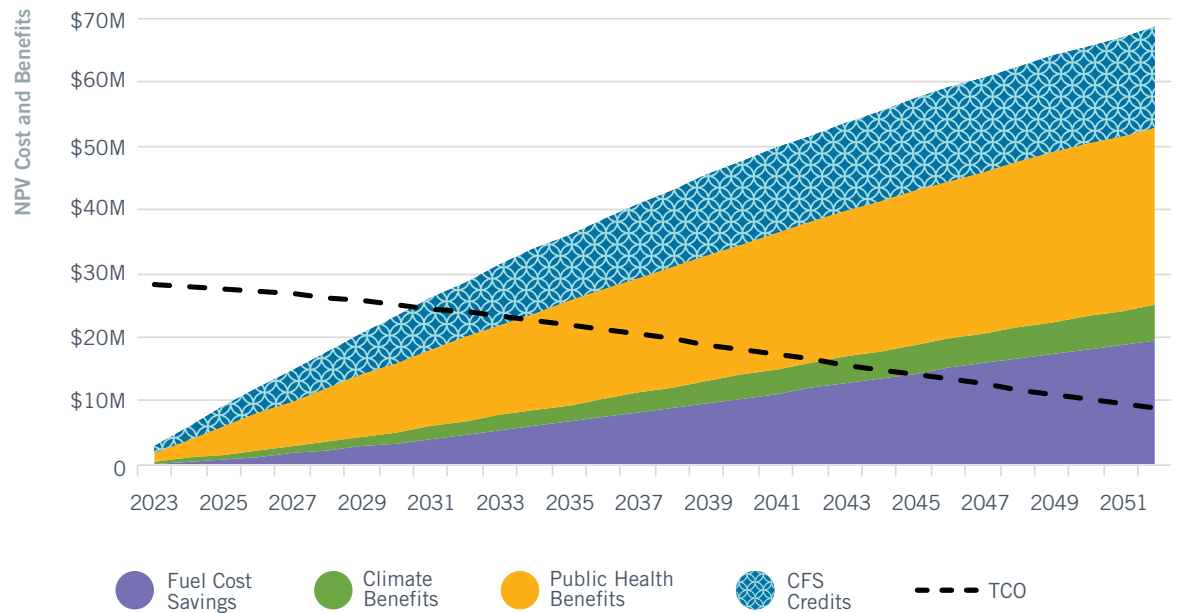
\$90 / tCO₂e

Potential CFS Credits, NPV

\$16 million

²University of Washington Department of Environmental & Occupational Health Sciences. Washington Environmental Health [Disparities Map](#): technical report. Seattle; 2019. t.ly/a8fm

NET COSTS, SAVINGS, AND VALUE OF BENEFITS OVER THE PROJECT LIFETIME



DISCUSSION

With close proximity to communities facing the highest environmental health burdens, this project is largely motivated by limiting toxic air pollutants from Harbor Island into surrounding neighborhoods. The public health benefits alone are roughly equivalent to the upfront capital costs over a 30-year, net present basis, based on a broad assessment of damages. Given the immediate proximity of these pollution sources to workers and to communities identified as being at the highest environmental health risk, using a broad average for public health benefits may significantly underestimate both the equity impacts and the total value of avoided health damages.

Fuel cost savings factor into the abatement costs of \$90 / tCO₂e, but these savings will be realized primarily by the vessel operators rather than the NWSA or partners who pay the design and construction costs. Clean Fuel Standard (CFS) credits are potentially substantial, but it remains unclear what portion could be claimed by the various parties involved in Shore Power investments and operation.

POTENTIAL SCALE AND IMPACT

T-18 is the largest container terminal across the NWSA harbors with the largest potential emissions benefit and would be the third of the five major NWSA international container terminals to allow for Shore Power. To the degree that OGVs increase shore power capabilities at a more rapid pace or displace engine use from lower-Tier, higher-pollution engines, the relative impacts of shore power at T-18 would be greater. Conversely, in the unlikely event that shore power capabilities of OGVs remain relatively stagnant, ship turnover or engine replacement to higher tiers is accelerated, or lower carbon fuels are integrated, the relative impacts of shore power at T-18 would be lower.