Clean & Prosperous Washington

Low Carbon Prosperity Institute

DRAYAGE TRUCKS

PROJECT BACKGROUND

Drayage trucks are on-road, heavy-duty Class 8 trucks that transport containers and bulk cargo from ports and railyards to another location. These trucks typically run on diesel and are a significant source of GHGs and other local air pollutants in and around ports. Electric battery powered drayage trucks are becoming more widely available, but remain more expensive to purchase than diesel drayage trucks.

PROJECT DESCRIPTION

The NorthWest Seaport Alliance's (NWSA) roughly 4,500 drayage trucks are the second largest source of GHG emissions in their scope of operations, behind ocean-going vessels. Both the harbors served by and the drayage truck routes traverse neighborhoods identified as having the highest environmental disparities risks due to diesel and particulate matter exposure.[3] The NWSA is planning for an electric truck pilot program covering ten battery electric class-8 drayage trucks and focused on scrapping used trucks. These trucks are expected to replace, and also assumed to fully displace, the use of 2007 model year trucks before the end of their useful life and travel 41,000 miles annually on average. Subsequent used diesel truck purchases are avoided over the operational life of the battery electric truck.

CASE STUDY RESULTS

Timeframe
12 years

Public Health Benefits
$80 to $90 / tCO_2e emitted

Cumulative Avoided Emissions
7 to 8 thousand tCO_2e

Cumulative Public Health and Climate Benefits, NPV
$0.80 to $0.85 million

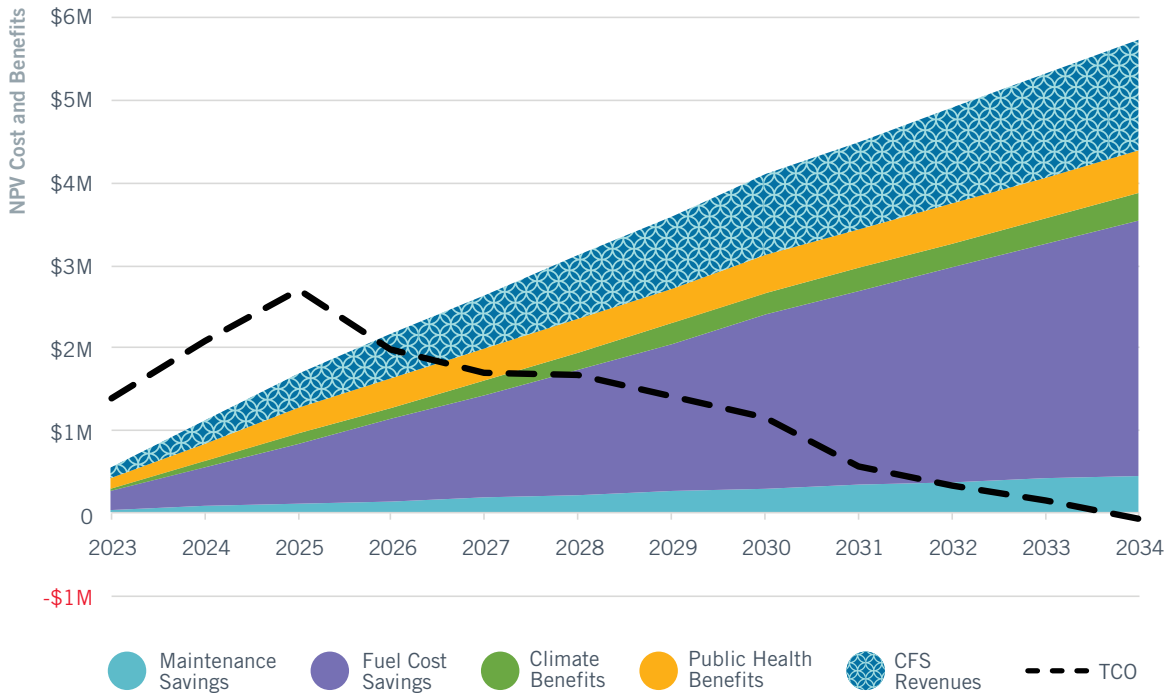
Total Costs, NPV
-$55 to $41 thousand

Abatement Cost, NPV
-$10 / tCO_2e

Potential CFS Credits, NPV
$1.0 to $1.1 million

[3]*University 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

Privately owned equipment purchases may be limited based on access to capital to afford the higher initial cost of an electric vehicle. One way to think about this barrier is to understand total costs of ownership (TCO) over shorter periods of time than the full equipment lifetime. Realizing a positive payback after several years may be necessary to justify the higher upfront cost and risk of implementing a new technology. To capture this perspective, we show the 3- and 5-year TCO for this case, including the upfront costs of the vehicle, the charging infrastructure costs, and the ongoing operational savings. We include a comparison with and without clean fuel standard (CFS) credits available to the equipment owner.

TCO premium per Drayage Truck

Timeframe	No CFS Credits	With CFS Credits
3-year	$270,000	$230,000
5-year	$170,000	$110,000

POTENTIAL SCALE AND IMPACT

This specific project focuses on a 10 truck demonstration. Scaling across the full drayage fleet could offer more efficient use of shared infrastructure and other benefits of scale. Assuming the results of this case study scale to the full range of 4,500 drayage trucks active at the port, total benefits would be 3.4 million tCO_2e avoided; $140 million in climate benefits; and $220 million in public health benefits. The likely scale of impact is smaller due to the limited share of older, lower engine tier trucks in the fleet and the general improvements in tailpipe pollution and fuel efficiency of later trucks--particularly 2010 or later models. Targeting higher annual Vehicle Miles Traveled (VMT) use cases initially would result in greater net benefits and more attractive total costs of ownership. Identifying priority routes, vehicle operators, and charging infrastructure locations could return greater public health benefits and promote environmental justice improvements.