Clean & Prosperous Washington
Low Carbon Prosperity Institute

MOTOR COACHES

PROJECT BACKGROUND

Motor coaches are large passenger buses used for a variety of routes, ranging from daily-fixed to trip-specific. Large uncertainties remain about the current and future incremental costs of electrifying motor coaches as well as infrastructure costs for charging equipment that can vary substantially by location.

In order to reduce motor coach emissions, incentive programs are often necessary. California's Hybrid and Zero-Emissions Truck and Bus Voucher Incentive Program (HVIP) is financed through revenue raised in the California Cap-and-Trade Program. Vouchers for new battery-electric vehicle purchases are the main category of available incentives in HVIP. The highest battery-electric incentives are set to $198,000 for certain school bus options, although for motor coach options the standard incentive is $120,000.

PROJECT DESCRIPTION

This case study focuses on a motor coach fleet operating throughout the Puget Sound and northwest region of Washington state. Starline Luxury Coaches owns and operates a fleet with 82 motor coaches and minibuses, which collectively travel nearly 2.4 million miles and consume nearly 320,000 gallons of fuel each year. Over 90% of this fuel consumption is from motor coaches.

To complete this analysis, we developed a new modeling tool that built additional metrics and sensitivities onto the California Air Resources Board (CARB) Low Carbon Transportation Program On-Road Consumer-Based Incentives Project Calculator Tool. The starting point for this case study is a model year 2024 motor coach with a 15-year lifetime and average annual mileage of 35,000 miles. These motor coaches are assumed to charge almost exclusively at the home base with the purchase financed over 5-years with 0 down payment. Cost premiums for the motor coaches relative to a new diesel model are assumed to range from $160,000 to $320,000 with charging infrastructure costs assumed to range from $20,000 to $100,000.

CASE STUDY RESULTS

Timeframe
15 years

Public Health Benefits
$32 / tCO_2e emitted

Cumulative Avoided Emissions
32 thousand tCO_2e

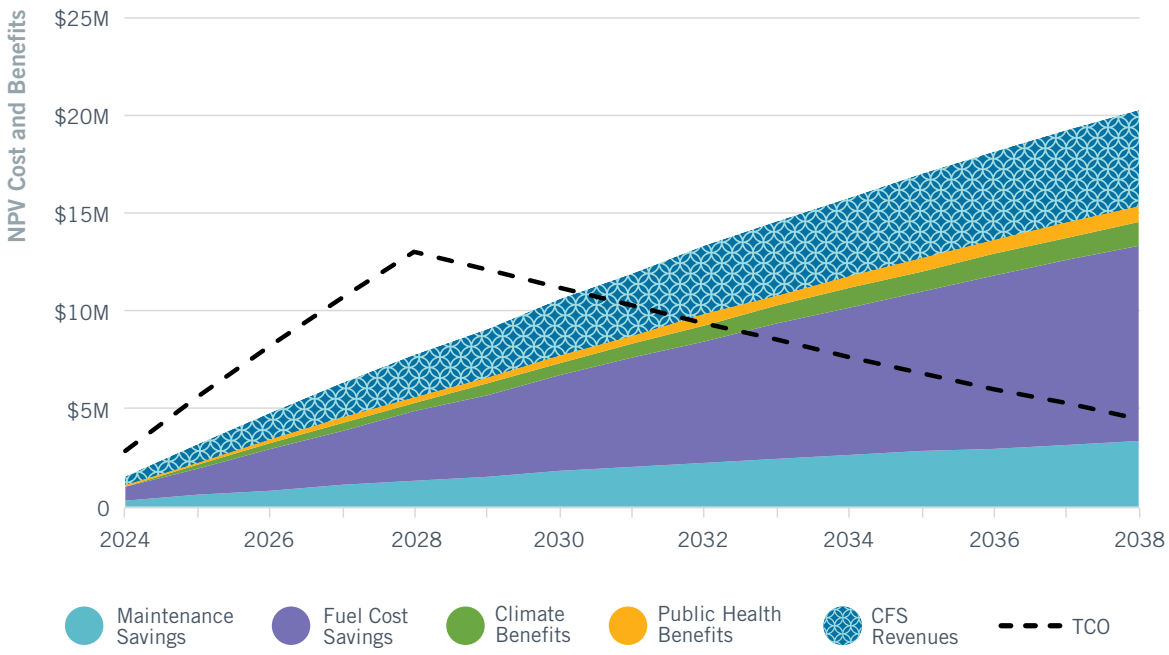
Cumulative Public Health and Climate Benefits, NPV
$2.0 million

Total Costs, NPV
-$3.0 million (low)
$4.5 million (mid)
$10.8 million (high)

Abatement Cost, NPV
-$130 / tCO_2e (low)
$190 / tCO_2e (mid)
$460 / tCO_2e (high)

Potential CFS Credits, NPV
$4.8 million

NET COSTS, SAVINGS, AND VALUE OF BENEFITS OVER THE PROJECT LIFETIME (MID-CASE)



DISCUSSION

The number of years to achieve a breakeven total cost of ownership (TCO equal to zero) is a factor in purchase decisions and incentive structure. The table below shows a range of TCOs for an electric motor coach over 3- and 5-year timeframes. Perspectives both without and with assumed revenues from the CFS credit are included.

Net Cost Timeframe	Low - no credits	Low - w/credits	Mid - no credits	Mid - w/credits	High - no credits	High - w/credits
3-year	$59,000	$36,000	$136,000	$114,000	$202,000	$180,000
5-year	$92,000	$57,000	$217,000	$181,000	$322,000	$287,000

Vehicles with stronger use cases (e.g., greater VMTs or a larger price differential between diesel and electricity) would have a more compelling financial case to switch, while vehicles that have weaker use cases (e.g., lower VMTs or a smaller price advantage of electricity relative to diesel) would have a less compelling financial case to make the switch. Consumers willing to tolerate longer payback periods could utilize lower incentives, all else being equal. Targeting the highest possible VMT use cases would result in greater climate and public health benefits as well as greater net savings through avoided fuel and maintenance costs.

POTENTIAL SCALE AND IMPACT

The long-term market potential for large truck electrification is enormous. Scaling the findings of this study (90% or greater emissions reductions) to the statewide market of class 7 and class 8 trucks (700 million gallons of fuel per year) yields a very rough, ballpark estimate of market potential: 70 million tCO_2e and nearly $4.4 billion in climate and public health benefits.