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The Requirements, Costs, and Benefits of Providing Charging Infrastructure for Heavy-Duty Electric Trucks at California's Rest Areas

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Issue

California's Advanced Clean Trucks regulation requires sales of zero-emission tractor-trailer trucks starting in 2024, increasing to 30% by 2030. Since most of these trucks will travel predominantly on the state's major highways, a robust network of battery charging infrastructure will be needed along these routes. The California Department of Transportation (Caltrans) maintains an extensive series of roadside rest areas throughout the state that are widely used by long-haul trucks. Providing charging at roadside rest areas, especially those along interstate highways, could help meet the needs of battery-electric tractor-trailer trucks making multi-day trips. Thus, Caltrans should consider becoming involved with the establishment of battery charging facilities at its rest areas.

Researchers at the University of California, Davis assessed the possibilities for and barriers to providing charging infrastructure for heavy-duty, long-haul trucks at rest areas in California.

Key Research Findings

Rest area charging stations can provide short "opportunity charging" during the day, as well as longer overnight charging. The researchers found that the most cost-effective approach to achieving 600-mile daily range capability in a battery-electric long-haul truck was to size the battery for 300 miles and use opportunity charging of the battery in one-hour stops up to twice per daily trip. This would require fast, 450 kilowatt (kW) chargers at rest areas. An electric truck with a 300-mile range could operate much like a diesel truck, with the

driver taking 60-minute breaks every 200-225 miles to charge the battery, resulting in a lower total cost of ownership than the diesel truck. A single 450 kW charger could charge multiple trucks overnight at slower charging rates.

Installation of four 450 kW charging units at a rest area is estimated to cost about \$1.5 million. The researchers estimated that each 450 kW charging unit would cost about \$375,000 for hardware and installation and that the appropriate number of chargers at each rest area would vary depending on anticipated use, but would likely be between two and six. If a charger served 25 trucks per day, the cost of electricity to operate that charger would be about \$500,000 per year. If truck charging facilities became eligible for the credits under California's Low Carbon Fuel Standard, the operator of the facility could recover its cost in about 5 years.

Establishing charging facilities at 35 of California's 86 rest areas would carry an initial cost of about \$50 million. This would allow stations to be about 100 miles apart or a little closer, which would be needed to serve trucks stopping for opportunity charging. Establishment of charging at multiple rest areas will initially be more important than developing large facilities at a limited number of locations.

Policy Implications

Policy changes at both the state and federal levels would be needed to permit Caltrans to participate in battery charging projects at rest areas. Current regulations prohibit commercial businesses at rest areas, meaning that fees cannot be collected for the electricity dispensed from charging

infrastructure. There has been consideration in both California and at the federal level to relax the non-commercial requirements at the rest areas for battery charging because the need for a battery charging network is well recognized.

Unlike charging stations for passenger cars, battery charging facilities for heavy duty trucks are not currently eligible for station credits under the state's Low Carbon Fuel Standard. Changing the Low Carbon Fuel Standard regulation to make such stations eligible in the fast charging program would permit Caltrans and all other investors in electric heavy-duty truck charging projects to recover their investment in 6 years or less. These policy changes would permit Caltrans to make a significant contribution to the establishment of a battery charging network for electric trucks in California in the early stage of market development, facilitating truck fleets' efforts to meet the state's Advanced Clean Trucks mandate.

More Information

This policy brief is drawn from "Assessment of Requirements, Costs, and Benefits of Providing Charging Facilities for Battery-Electric Heavy-Duty Trucks at Safety Roadside Rest Areas," a report from the National Center for Sustainable Transportation, authored by Andrew Burke of University of California, Davis. The full report can be found on the NCST website at <https://ncst.ucdavis.edu/project/assessment-requirements-costs-and-benefits-providing-battery-charging-battery-electric>.

For more information about the findings presented in this brief, contact Andrew Burke at afburke@ucdavis.edu.

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