

Commercial truck electrification is within reach

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When it comes to electric vehicles, particularly for heavy-duty trucks, the limitations of battery technology are often seen as the main barrier to widespread adoption. However, a new analysis concludes that it's the lack of appropriate policies around adoption incentives, charging infrastructure, and electricity pricing that prevents widespread electrification of commercial trucking fleets.

Researchers from the Department of Energy's Lawrence Berkeley National Laboratory (Berkeley Lab) and the University of California, Los Angeles published a new study that makes the case for prioritizing public policy to help move long-haul trucking from diesel to electric. Doing so will mean huge gains in addressing the climate crisis and avoiding premature deaths due to local vehicular pollution, which disproportionately affects communities of color.

The study analyzes the total cost of ownership of an electric long-haul truck compared to a diesel long-haul truck. Using the current price of a battery pack and assuming a 375-mile range, the

researchers found that an electric long-haul truck has a 13% per mile lower total cost of ownership, with a net savings of \$200,000 over the lifetime of the electric truck. The total cost of ownership analysis takes into account the purchase price and operating costs over the lifetime of the truck.

The researchers also showed that future reductions in battery costs—taken together with a more aerodynamic design and monetized benefits of reduced pollution—would result in a 50% per mile lower total cost of ownership compared to a diesel long-haul truck by 2030. The electrification of long-haul trucks therefore is possible, and figuring out what is required to move the nation's trucking fleet to widely adopt electric trucks is the next step, the authors said.

"Given the massive economic and environmental benefits, the case for long-haul electric trucking is stronger than ever before," said Berkeley Lab Research Scientist Nikit Abhyankar, one of the authors of the study. "Enabling policies such as adoption and charging infrastructure incentives, sales mandates, and cost-reflective electricity pricing are crucial."

Why focus on long-haul trucks?

Electric cars are becoming more prevalent now, with a substantial increase in global sales and commitments from several major auto manufacturers, including General Motors and Volvo, to sell only [electric vehicles](#) by 2030-2035. Long-haul trucks have not experienced the same level of growth, yet they are diesel-fuel guzzlers and a major source of air pollution, contributing more than 20% of U.S. transportation-sector greenhouse gas emissions.

Berkeley Lab scientists have done extensive research tracking the impact of diesel trucks on air quality and public health in disadvantaged communities. Even though diesel trucks account for

just a small fraction of motor vehicles, they are responsible for almost one-third of motor vehicle CO₂ emissions. The transportation sector was the largest contributor of CO₂ emissions associated with the U.S. economy.

"If we can move away from diesel-dependent heavy-duty vehicles, we have a chance at significantly reducing greenhouse gas and particulate emissions from the transportation sector," said Berkeley Lab Staff Scientist Amol Phadke, lead author on this study.

There are currently two main pathways to electrify trucks—fuel cells and batteries—and both are actively being pursued by researchers at Berkeley Lab. Long-haul trucks powered by hydrogen fuel cells are on the horizon, and Berkeley Lab scientists are playing a leading role in a new DOE consortium called the Million Mile Fuel Cell Truck (M2FCT) to advance this technology. Battery-powered electric trucks have seen the most dramatic improvements in technology in recent years, making the battery costs more affordable and competitive.

What's more, electricity from [renewable energy sources](#) is becoming more cost-competitive, and Berkeley Lab researchers have shown that decarbonizing the electric grid is feasible in the coming decades, which means electric long-haul trucks would no longer contribute to greenhouse gas emissions.

"It is exciting to see recent dramatic improvements in battery technology and [costs](#)," said Phadke.

"Electric trucks can generate significant financial savings for truck owners and fleet operators, while enabling inflation-proof freight transportation that can have significant macroeconomic benefits."

Provided by Lawrence Berkeley National Laboratory

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