

The true cost: Deploying electric vehicle charging infrastructure nationwide

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Electrical vehicle charging station. Credit: Idaho National Laboratory
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When President Biden signed the Bipartisan Infrastructure Law in 2021, he announced a goal to install 500,000 new electric vehicle chargers

across the nation by 2030. The Department of Energy's Vehicle Technologies Office has tasked the experts at Idaho National Laboratory to answer big questions surrounding this goal.

One of those questions involves determining the true cost of electric vehicle operation to ultimately enable their widespread adoption. Understanding this cost will allow the transportation sector to provide an equitable and affordable solution for all Americans.

In response, INL researchers published a [report](#) that demonstrates a model to standardize cost data for charging [infrastructure](#). This report will help policymakers understand how much it would cost to deploy a national charging network. Amid this research, though, researchers realized their original cost model couldn't give them the answers they needed.

"We had worked on a report last year where we analyzed charger-related costs mostly with data from one charger installation service provider," said Jean Chu, an INL researcher who coauthored the paper. "Then we decided to expand upon that work and analyze costs of charging equipment more broadly."

The team quickly ran into a significant snag. The goal of the paper was to use [meta-analysis](#) and a literature review to establish the average cost of charging station infrastructure for many different applications. Meta-analysis refers to a social science technique where researchers evaluate existing literature on a topic to try to produce an aggregate figure for the phenomenon in question—in this case, the average costs associated with charging infrastructure.

However, when team members reviewed the data, they learned that different studies used different measures to report electric vehicle supply equipment (EVSE) costs. As a result, they couldn't reliably

compile comprehensive figures.

"It was difficult to construct this complete figure because, across the data, we were comparing apples to oranges," said Torrey Lyons, the lead author of the paper. "Instead, we represented all the common figures that we found, which required some additional analysis beyond the final measures presented in our sample of studies."

Their biggest accomplishment was creating a new protocol for measuring EVSE cost figures. The [paper](#), published in *Sustainability*, outlines a convention for representing these costs more consistently in future research. Their goal now is to make sure other researchers in this space learn about and embrace this convention.

Without that convention, it's impossible to adequately use years of studies to evaluate how costs have changed over time. This will be essential for ensuring charging infrastructure affordability. A lot of policy decisions will require comparative understanding of cost data, which means the data first needs to be in a consistent format. Even as this convention for measuring cost data helps researchers and policymakers, it also helps future drivers.

"Understanding the true EVSE cost is important to understanding what it will take to ensure everyone has access to charging infrastructure," said Chu. "This convention will allow us to track public investment needed for charging stations and how those investments relate to geographic and socioeconomic patterns throughout the country."

As federally funded charging stations are deployed, policymakers will need to ensure that investments are spread across the country in a manner that is fair and equitable. "If we don't know the true cost, it would be hard to understand if investment discrepancies are due to [regional differences](#) in costs or inequitable funding," said Chu.

Although team members couldn't answer their initial question with this paper, they identified a previously unknown problem and solved it. The conventional metrics that they've developed, if used properly, will allow them and others to evaluate future cost trends. This data helps ensure that as electric vehicle charging becomes more widespread, policymakers and equipment manufacturers will have the tools to make it more accessible.

More information: Torrey Lyons et al, The Current State of Light-Duty Electric Vehicle Supply Equipment Costs: An Assessment of Contemporary Understanding, *Sustainability* (2023). [DOI: 10.3390/su152316373](https://doi.org/10.3390/su152316373)

Provided by Idaho National Laboratory

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