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The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure
A Nationwide Assessment

With ambitious federal clean energy policies, pledges by automotive companies to transition to zero-emission vehicles, and accelerating consumer demand for electric vehicles (EVs), analysts have projected that by 2030, EVs could account for 30–42 million light-duty vehicles on the road.

Now, a seminal study by the National Renewable Energy Laboratory (NREL) has quantified the estimated number, type, and location of the chargers needed nationwide to ensure convenient, reliable, and affordable charging for all Americans.

The 2030 National Charging Network study leverages cutting-edge NREL analytical tools and advanced computing capabilities to account for the many ways Americans travel by car: **commuting, running errands, taking road trips, hailing rides**, and more.

With a never-before-seen level of detail, it also accounts for the effects of city-to-city differences in climate, travel patterns, housing, and charging preferences on EV charging infrastructure needs. This fact sheet summarizes the study's key findings.

Key Findings

Number of Chargers Needed Nationwide: The 2030 National Charging Network study estimates that a national network could be composed of 26–35 million ports to support 30–42 million EVs. For a mid-adoption scenario of 33 million plug-in electric vehicles, a national network could consist of 28 million ports.

Charger Types and Installation Locations:

- 1.2 million public charging ports, comprising:
  - 182,000 fast chargers (along highways and in various communities)
  - 1 million Level 2 charging ports in publicly accessible locations (near high-density neighborhoods, office buildings, and retail outlets).
- 26.8 million Level 1 and Level 2 charging ports in privately accessible locations (including single-family homes, multifamily properties, and workplaces).

These figures reflect EV drivers' preferences for convenient and cost-effective charging, primarily at home, in concert with a reliable network of public, high-power fast chargers.

Analytical Tools

Proprietary NREL tools were used to create the data models fueling the study's findings, including:

EVI-Pro: To project typical daily demands for EV charging
nrel.gov/evi-pro

EVI-RoadTrip: To project amounts and locations of chargers needed for long-distance travel
nrel.gov/evi-roadtrip

EVI-OnDemand: To estimate the charging infrastructure needed to support electrified ride-hailing fleets
github.com/NREL/EVI-OnDemand

Transportation Energy & Mobility Pathway Options (TEMPO) Model: To project EV adoption and fleet evolution over time
nrel.gov/tempo-model

Key Takeaways

Continued investments in U.S. charging infrastructure are necessary, though existing announcements put the United States on a path to achieving federal clean energy goals. Investment from partners including utilities, private industry, and local governments will ultimately be necessary to support EVs nationwide.

To support continued investment, simulated data for every region and state in the United States is now available (data.nrel.gov/submissions/214), showing different infrastructure needs based on climate, travel patterns, housing types, and charging preferences. These findings may help cities determine their baseline infrastructure needs.

> "This report supports the vision of the Joint Office by presenting a quantitative analysis of what a national EV charging network might entail in terms of size, cost, charger composition, and installation locations."
>
> Gabriel Klein, Executive Director of the Joint Office of Energy and Transportation

Partners

The 2030 National Charging Network study was created in collaboration with the Joint Office of Energy and Transportation (Joint Office) and the U.S. Department of Energy's Vehicle Technologies Office.

The study provides quantitative analysis to support the Joint Office's vision of creating a nationwide EV charging network that is convenient, affordable, reliable, and equitable to enable "a future where everyone can ride and drive electric."

Call to Action

Government and private industry stakeholders are encouraged to access the study's publicly available data on the number, type, location, and cost of the chargers needed to shore up the nation's EV charging infrastructure. The data, broken out by communities, can help determine baseline infrastructure needs.

View the Data:
data.nrel.gov/submissions/214

View the Full Report:
nrel.gov/docs/fy23osti/85654.pdf

Contact

Eric Wood
Eric.Wood@nrel.gov
303-275-3290