

Fleet Electrification Planning and Assessment



Background, Objectives, and New Learnings

The transition towards electrified transportation is underway, with increasing numbers of new electric vehicle sales each year. Freight and delivery companies, bus and taxi operators, service stations, and many other fleet entities have the potential to rapidly introduce fleet charging. Although distribution utilities are aware that fleet electrification is imminent, there is still significant uncertainty on where demand on the grid for fleet charging will be, what their needs will be, and how a utility can proactively prepare to support its customers and the grid.

To support this need, EPRI's Electric Transportation and Distribution Operations and Planning R&D programs have developed new processes and analytical capabilities to enable utilities to efficiently plan and design cost-effective solutions for fleet electric vehicle (EV) charging infrastructure.

This project seeks to apply these new resources to help utilities evaluate vehicle and charging, characterize fleet travel patterns and technology needs, predict future fleet locations and sizes, quantify grid capacity to accommodate fleet electrification, and identify cost-effective integration solutions.

By accomplishing these objectives, this project is expected to result in multiple new learnings, including fleet charging behavior and load shape data, how fleet vehicle and charging technology are expected to evolve, and how distribution planning tools can be used effectively for fleet segments that to-date have not been represented in utility grid models. These findings are expected to inform a fleet electrification infrastructure roadmap.

Project Highlights:

- Providing customer- and grid-specific processes, considerations, and analytics for utilities to proactively support current and future fleet customers
- Forecasting future fleet electrification locations and capacity energy needs to inform distribution, transmission, and resource planning
- Supporting utilities in understanding fleet customer needs and plan for scenarios of large-scale fleet electrification

Benefits

This project aims to help utilities:

- Meet broad electrification and sustainability targets by pro-actively planning for future electrification needs
- Quantify fleet load characteristics, charging infrastructure needs, and forecasts of future fleets
- Enable strategic and cost-effective investment by identifying high-priority feeders for grid-strengthening
- Provide faster turnaround time on fleet customers' interconnection applications

Project Approach and Summary

Fleet Electrification Characterization: EPRI plans to conduct representative real-world fleet assessments for three key fleet segments to inform the subsequent grid planning studies. The fleet segments may include transit buses, logistics operations last mile delivery, and freight (drayage, corridor, or long-haul). Tasks include:

- Fleet operation and needs assessment: For each segment, work with project participants and fleet customers to understand travel patterns, vehicles types and quantities, and future fleet electrification intentions.
- Technology maturity assessment: Assess the market status of the vehicles, high-power charging equipment, and supporting infrastructure relevant to each segment through OEM and other stakeholder interviews as well as other methods to understand the technology trajectory and what this may mean for future planning needs.
- Charging strategies and applications: Develop a broad characterization of fleet charging behavior for each

segment, including on-route versus depot-based charging, and translate this into implications for charging infrastructure needs, charge management strategies, and how this is expected to evolve over time.

Grid Planning for Fleet Electrification: EPRI plans to support utilities in preparing for future electrification by applying the new analytical tools on the participating utilities system to assess impacts. Tasks include:

- **Assess wide-area grid electrification opportunity:** Apply advanced grid analytics tools to assess the capability of the grid to integrate fleet electrification. Identify areas with under-utilized assets that can support electrification as well as areas with limited capabilities.
- **Future Fleet Electrification Assessment:** Identify potential fleet segment vehicle sites, estimate the number and type of vehicles using aerial imagery, and estimate the demand/energy needs associated with electrification.
- **Grid readiness and integration assessment:** Merge fleet forecast parameters (location, demand, etc.) with the wide-area assessment to identify how much electrified fleet load can be accommodated with existing infrastructure and identify high-priority feeders for grid-strengthening investment. Assess integration costs and mitigation solutions (grid infrastructure, NWA, charge management, etc.)

Optional Task A: Transmission Impact Assessment

EPRI will work with project participants to assess the power flow impacts of ten commercial EV charging stations.

Optional Task B: Site-Specific Fleet Connection Analysis

EPRI will work with project participants and their fleet customer(s), to quantify near-term, site-specific fleet electrification needs and integration solutions for a specific site, including: characterize site-specific energy/demand requirements, identify managed charging options, grid and non-wires mitigation solutions that are needed to enable electrification, perform techno-economic analysis of mitigation solutions that facilitate timely and cost-effective integration.

Deliverables

- Periodic project webcasts to gather participant guidance and to provide updates on project progress
- Summary report documenting characteristics of different fleet segments, the state of the technology, and fleet operation strategies

- Utility-specific report describing results from the grid planning activity
- Tech transfer workshop for all participants on the analysis process and implementation

The non-proprietary results of this work will be incorporated into EPRI's R&D programs and made available to the public, for purchase, or otherwise.

Price of Project

Base Project: \$220,000 (5 members minimum to start)

Optional Task A: \$80,000

Optional Task B: \$45,000 per site

This project qualifies for Tailored Collaboration (TC) or Self-Directed Funding (SDF). Funding can be distributed across three calendar years.

Project Status and Schedule

This project is expected to begin in Q3/2021 and last for 24 months, with utility-specific analysis delivered sooner.

Who Should Join?

Utilities currently developing strategies for EV adoption, undergoing grid modernization efforts, or anticipating high DER or variable load adoption.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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