Alliance for Transportation Electrification

ATE Education and Outreach (E&O) Task Force

November 2023

Issue Brief

Tools to Enable Fleet Electrification at Scale

The ATE Education & Outreach (E&O) Task Force first formed in 2018 to discuss the need for greater utility involvement in educating Commissioners, staff and utility customers about electric vehicles (EVs) and their benefits and the program design and rate structures for both residential and commercial EV programs. Through peer-to-peer learning opportunities, external speakers and internal research, the ATE presents its members with best practices for implementing EV education and outreach programs. The task force released a white paper in 2020 titled, "The Missing Piece on Meeting Transportation Electrification Goals: Utility Education and Outreach Programs", which laid the framework for greater utility investment in education and outreach programs. After a short pandemic-induced hiatus, the task force regrouped in 2022 with a focus on understanding best practices surrounding fleet electrification due to the growing interest from commercial customers on electrifying their fleets. The co-Chairs of the E&O Task Force are Katherine Stainken, a Principal in Transportation Electrification at EPRI (Electric Power Research Institute), and Joel Levin, the Executive Director of the non-profit EV advocacy group Plug in America. The task force reports up to the Policy-Regulatory Committee, chaired by Chris Budzynski of Exelon, and the Board of Directors.

Executive Summary

Long-term planning for electric infrastructure has always been a core competency of utilities. Yet our economy is rapidly electrifying today, especially in the transportation sector, for several critical reasons including decarbonization, technology and innovation, and economic development and workforce. The need for utilities to plan and have the right tools and reports to prepare for the mass adoption of EVs is more urgent than ever.

Utilities will be asked to coordinate with state, city and local government plans to electrify certain highways and routes, as well as certain key public transportation functions such as public transit and school bus fleets. Moreover, commercial fleets and key customers of utilities are moving to electrify their vehicles for sustainability, environmental, and other reasons. Utilities will need to coordinate closely, using tools such as Fleet Advisory Services (FAS), with such commercial customers on how best to optimize both their fleet electrification and optimize the distribution grid.[1] This level of coordination and planning at the distribution level takes regular order Integrated Resource Planning (IRP) and Distribution System Planning processes to the next level.

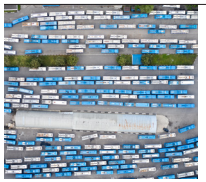
For example, as utilities work with their states on installing EV charging systems along highway corridors under the National EV Infrastructure (NEVI) program, a white paper released by National Grid shows that utilities must be planning for 0.6 MW of power for these highway stations initially, growing to 5 MW for a typical highway plaza in 2030, and 19 MW for a truck stop plaza in 2035 – the size of a small town.[2] As ports begin to electrify their equipment – both inland and onshore ports, the power requirements can also range from 25 MWh/year for one forklift to 765 MWh/year or more for one switcher locomotive.[3] Several other significant end use cases, such as airports, car rental agencies, and transportation network companies (TNCs), are also moving on their electrification journeys.

This Issue Brief examines some of the planning, reports and tools utilities are undertaking to be able to respond to requests from state, city and local governments, and especially their commercial customers as all groups plan for the switch to electric fuel.

1 Read more on utility fleet advisory services with the ATE/Electrification Coalition issue brief titled, "Fleet Advisory Services (FAS) for Fleet Electrification: Meet Customer Needs and Provide Grid Benefits," available here: ***https://electrificationcoalition.org/wp-content/uploads/2023/02/FAS.White-Paper.E.O.task_.force_.FINAL_.2.23.23.pdf***

2 ***https://www.nationalgrid.com/document/148616/download***

3 Data from the National Port Strategy Assessment, available here: ***https://www.epa.gov/ports-initiative/national-port-strategy-assessment-reducing-air-pollution-and-greenhouse-gases-us***
See page 2 of the ICF report further analyzing the EPA National Port Strategy Assessment with potential load impacts of port electrification shown:
https://www.icf.com/insights/energy/port-electrification-benefits-the-local-economy-and-environment-while-providing-new-electric-load-for-utilities



Introduction

The awareness of the benefits and savings from electric vehicles (EVs) is rapidly growing amongst consumers and fleet operators, whether in the public or private sector, and for both light- and medium- and heavy-duty EVs. The increase in federal funding will help to tackle some of the final barriers to greater EV adoption, including increasing the access to EV charging infrastructure, lowering the upfront purchase price, enhancing the EV workforce for installing and repairing vehicles and charging stations, and building out access to a robust and reliable EV supply chain.

This transition to electricity in the transportation sector will not occur without significant planning and coordination amongst various stakeholders. Most recently, states have coordinated with cities and utilities on the National EV Infrastructure Program (NEVI), which provides funding to each state via a formula to build out a network of EV charging stations along designated highway corridors. The Charging and Fueling Infrastructure (CFI) Grant Program ($2.5 billion) – particularly the 50% set-aside for community grants – will also require a significant amount of coordination and planning between utilities, states, cities, local governments and more for a successful application. To help states manage the overall planning for transportation electrification (TE), certain federal level programs have made planning and technical assistance an eligible activity under the following programs. Some new examples include the CFI Grant Program, the NEVI Program, the Clean Heavy-Duty Program, the State Energy Program, the Voluntary Airport Low Emission Program, and the Airport ZEV Program.[4] As the public sector leverages this funding to be able to plan for transportation electrification loads, utilities are also working to prepare for transportation electrification loads at scale.

4 See more on pages 73-83 of the DOT's "Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure", available here: ***https://www.transportation.gov/sites/dot.gov/files/2022-01/Charging-Forward_A-Toolkit-for-Planning-and-Funding-Rural-Electric-Mobility-Infrastructure_Feb2022.pdf***
Also see the Funding Finder tool from the Electrification Coalition that details which funding is applicable to planning here: ***https://electrificationcoalition.org/ev-funding-finder/***

Case Studies

EPRI's EVs2Scale 2030 Initiative

EPRI's EVs2Scale2030™ initiative is a three-year commitment focused on leveraging industry scale to galvanize and align critical market stakeholders as electric vehicles are deployed at scale to achieve 2030 electrification goals. EPRI will leverage its industry partnerships to mobilize utilities, fleet operators, the automotive industry, and charging providers, and coordinate with federal agencies and labs, to support the rapid deployment of millions of electric vehicles – while minimizing grid impacts and enabling critical benefits to the nation's grid.
To assist with this effort, EVs2Scale2030 has developed two important tools: eRoadMAP™ and GridFAST™.

EPRI's eRoadMAP™ is a first-of-its-kind national online interactive grid planning resource developed to help electric utilities and other stakeholders prepare to meet the needs of transportation electrification by identifying when, where, and how much load electric vehicles will represent across the entire U.S. electric grid. This tool allows users to explore how quickly EVs are expected in different regions and identify granular charging needs across the country at the individual feeder lever—where the power is transmitted from the generating or substation to its distribution points. This free and public resource highlights both immediate and future charging needs.

eRoadMAP™ visualizes the unprecedented 2030 electrification challenge in a 50-state roadmap that outlines the year-over-year grid loads in various scenarios, including a 100% electrification goal, a scenario that meets market goals and regulations, and actual planned electrification efforts. The maps will also demonstrate the charging and grid infrastructure needs, lead times, costs, and workforce required to achieve the 2030 goals.

GridFAST™ is a secure data exchange designed to foster early connections between large EV customers and utilities across the country. Customers can use GridFAST™ to share their early vehicle electrification plans with multiple utilities at once using a standardized format. The platform validates these plans in terms that are useful for utilities and provides them with early insights to help get ahead of long-lead-time grid upgrades that may be required. This tool is designed to facilitate early conversations and information-sharing to benefit EVSE project planners and electric companies across the country as well as support project planning in the scale-up to meet the nation's ambitious 2030 electrification goals. GridFAST™ works to address critical barriers to scaling EV projects, including the necessary information and data for a more streamlined interconnection process between the developer and the utility.

nationalgrid

National Grid Reports

To assist with their planning efforts and load management strategies, National Grid has commissioned a series of reports to help prepare for transportation electrification loads. The first report, released in September 2021 titled, "The Road to Transportation Decarbonization: Understanding Grid Impacts of Electric Fleets," [5] focused on a Top 100 metro region to understand how differences in fleet locations, usage patterns, fleet sizes, vehicle types, and/or charging patterns impact specific portions of distribution or transmission systems. The report found that overall, fleet electrification would require strong collaboration and proactive planning, as fleets are typically clustered in specific geographic areas; the new load from electric medium- and heavy-duty vehicles could eventually exceed the distribution line capacity if not addressed early on.

Next, National Grid issued a white paper titled "Electric Highways: Accelerating and Optimizing Fast-Charging Deployment for Carbon-Free Transportation," [6] to examine the planning considerations for alternative-fueled corridors with the freight and goods movement in mind. This first of its kind study examined the traffic patterns and infrastructure needed to support the transportation decarbonization mandates in NY and MA, the service territories for National Grid. The white paper looked at 71 sites in both states, with results showing that by 2030, over a quarter of the sites would need more than 5 MW of capacity to meet peak charging demand. The study notes, "Depending on local system voltages, this level of electric demand at a specific site may exceed the delivery limits of a typical distribution system interconnection and therefore require interconnection to the high-voltage transmission system. Some high-demand charging sites could reach around 40 MW in peak charging capacity by 2045, which is equivalent to the electric load of a major industrial site." [7]

The white paper notes that historically it takes four to eight years to develop transmission projects to serve traditional large commercial loads, like stadiums and factories, which was sufficient to meet capacity and reliability needs. But it also notes that the development timeframes for public EV charging stations are considerably shorter and will need to be addressed. For example, despite recent inflationary trends, it expects the costs of EVs and batteries to continue to decline and the recent federal bills providing both infrastructure funding and tax credits will accelerate the pace of EV charging deployments. Without good planning and proactive infrastructure investments, lagging grid infrastructure not meeting customer timeframes could instead become a bottleneck to greater EV adoption, slowing down state carbon emission reduction goals and targets, and fleet electrification targets as well. Ultimately, utilities need to be prepared for depot charging as well as highway charging – and both will require significant electric capacity.

National Grid was able to share the results of the white paper with MA DOT and NY DOT to help them be aware of the advanced planning that will be required to enable highway charging for both the light-duty and the MHD vehicle sectors.

Most recently, National Grid released a report, "The Road to Transportation Decarbonization: Readying the Grid for Electric Fleets" [8] that examines one "study feeder" line in its service territory, estimating the electric demand and system impacts as MHD vehicles in fleets electrify. The study found that when 10% of the 400 electric trucks electrify along that feeder line at a depot, peak demand will almost double. At 33% of the total trucks electrified, the capacity along the study feeder will be exhausted. The study shows that utilities need to carry out proactive infrastructure planning now to meet the coming load from electrification of MHD vehicles, whether by deploying low-cost solutions to defer the load to other feeder lines (dynamic grid optimization) or building an actual feeder upgrade to increase line capacity.

5 ***https://www.nationalgrid.com/document/150121/download***

6 ***https://www.nationalgrid.com/document/148616/download***

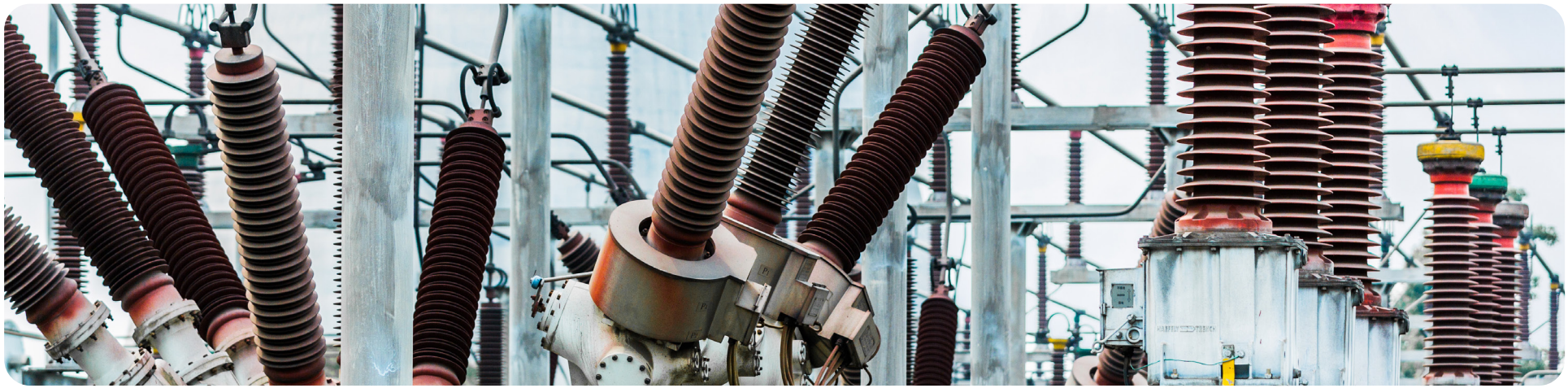
7 ***https://www.nationalgrid.com/document/148616/download***

8 ***https://www.nationalgrid.com/document/150356/download***

ONCOR's Fleet Load Growth Calculator and Mapping Tool

Oncor has various tools ready to prepare for the transition to EVs. Their "Fleet Load Growth Calculator and Mapping Tool" helps the utility to prepare for which fleets are likely to electrify based on the class of vehicle, and where their charging stations might be located on the distribution lines. Oncor has worked with the AWS (Amazon Web Services) bootcamp program to develop its unique tool, while using a variety of sources of data including commercial vehicle registration data to understand better the location and duty cycles of fleets. The fleet is given an overall score on the likelihood of electrification, concluding the first part of the project. The second part of the project layers the distribution capacity infrastructure data with the high-capacity electrification points to find the areas that would be strained in terms of the capacity. Since traditional distribution planning does not factor in EV projections and loads at the distribution level, this information is critically important to provide to the distribution system planners. As the load potential with EVs is significant, this process provides a quantitative method to factor in EVs. Oncor notes that fleet electrification with commercial customers can move quickly, so having a tool to determine where the load might be needed on which distribution lines is immensely valuable.

While this tool is being used for commercial customers and EV fleet deployment, Oncor is interested in creating a similar tool for the build-out of EV charging stations along highways under the NEVI program. Oncor notes that the early years of the NEVI program require manageable loads (namely, a program requirement of 4 x 150kW charging stations every 50 miles along a highway corridor) and capacity in their service territory. But it also notes that unless careful and coordinated planning is done by utilities, EV service providers and state departments of transportation could see the possible situation of redundant EV charging stations (and multiple ports), which may complicate the utility processes for capacity planning for reliability and ensuring timely interconnections.



Entergy eMobility Analysis Tool

Entergy has developed a unique tool [9] for fleet owners and operators that is a combination of a total cost of ownership tool for the vehicles, but also adds in aspects of charging infrastructure and any grid upgrades that are needed, representing a complete package for the customer at no cost to use. Designed originally for fleets, the tool is a way for the fleet owners and operators to be educated on the process for electrifying their fleet too, before Entergy is even brought in to advise the fleet operators further. The tool allows the fleet operator to create a profile of current fleet vehicles and shows the fuel and maintenance savings by switching to electric. The fleet operator then adds in the EV charging infrastructure based on the application for the fleet; for example, DCFC for vehicles needing to be turned around and back on the road again quickly, or L2 for slower, overnight or early morning charging. At this point, Entergy will start to work with the interested customer and help to explain the difference with various types of EV charging infrastructure, including options for smart chargers, options for the charging station pedestal base, and options for the cord management. Information can also be added in to the profile on any grid upgrades needed, construction costs, shipping, taxes, project execution dates, and more.
At the end of the process, the fleet operator has a detailed understanding of all that is required to electrify the fleet, the costs and the timeline.

The last step in the process involves Entergy and the fleet operator talking through options for paying for the EV charging infrastructure, any upgrades, cost of service and more. Entergy has a bill rider approved and available under 3 of their 5 operating companies so far, with the bill riders for the other two operating companies under development. The bill rider helps the fleet operator be able to pay for the EV charging infrastructure, any upgrades based on cost of service over a period of one to ten years. While this may sound like charging-as-a-service (CaaS), the initial construction costs and upgrades could be included, not just the cost of the EV charging infrastructure and electricity use.

Entergy is already seeing an organic uptake of the tool, without any marketing, showing the high local interest of fleet owners and operators to electrify their fleet. Entergy partnered with ZappyRide, a J.D. Power company, to integrate the latest vehicle and charger data via an API to improve the information and experience for both residential and commercial customers. The Entergy eMobility Analysis Tool is a comprehensive tool that presents all the information the fleet operator and utility need to proceed to be contract ready. Entergy foresees this tool leading to quicker installation times for EV charging infrastructure projects. While the tool was designed for fleets, Entergy also sees the tool being applied to other use cases such as workplace charging as well.

9 ***https://emobility.entergy.com/***

Conclusion

To prepare for the transition to EVs across all vehicle classes, but particularly for fleets in the MHD sector, utilities need to have the right tools and reports at their fingertips. Should states want to accelerate the adoption of EVs, the right planning and preparing needs to happen now. Whether it is a report on understanding the power needs for electrifying MHD freight corridors in a region, or tools that allow for understanding which customers with large fleets might electrify along a certain distribution line, or tools that provide insight for utilities and their customers to understand the entire cost and process for electrifying their fleet, we are just at the start of new reports and tools coming on to the scene that will allow for utilities to engage with their customers, local government and states. Commissioners, staff and utilities should expect more collaboration across the state and regionally as MHD fleets transition to electric and more granular forecasting at the distribution level is needed on the grid-side to ensure that transportation loads will be swiftly and adequately served.