Utility Best Practices for EV Infrastructure Deployment

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The Smart Electric Power Alliance (SEPA) is dedicated to helping electric power stakeholders address the most pressing issues they encounter as they pursue the transition to a clean and modern electric future and a carbon-free energy system by 2050. We are a trusted partner providing education, research, standards, and collaboration to help utilities, electric customers, and other industry players across four pathways: Transportation Electrification, Grid Integration, Regulatory Innovation and Utility Business Models. Through educational activities, working groups, peer-to-peer engagements and custom projects, SEPA convenes interested parties to facilitate information exchange and knowledge transfer to offer the highest value for our members and partner organizations. For more information, visit www.sepapower.org.

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About the Report

This report was written by individuals with extensive experience building and working with utility electric vehicle (EV) programs and transportation electrification teams. The authors have firsthand experience with EV deployment and challenges, and have developed this report for the benefit of all readers. This report combines results from industry surveys with utility and stakeholder insights to deliver a comprehensive set of recommendations and best practices for improving utility transportation electrification programs. While the report is primarily written for the utility industry, non-utility readers can also benefit.

This is the second report in a two-part series. The first report, published in October 2019, “Preparing for an Electric Vehicle Future: How Utilities Can Succeed,” made a clarion call for utilities to be proactive in planning for a variety of EV charging infrastructure deployment scenarios and to better address internal and external program challenges. This second report builds upon that call by providing further direction on how to organize effective utility teams and strategically plan for EV adoption.

SEPA Working Group Industry Survey

The SEPA Electric Vehicle Working Group, Distribution Planning Subcommittee prepared a comprehensive 50-question industry survey. The survey was distributed by SEPA to a subset of its members and partner organizations between December 2018 and February 2019 via a Qualtrics online survey platform. Two different sets of questions were tailored to utility and non-utility survey respondents. The survey yielded 48 responses. Results from this survey (heretofore referenced as the ‘industry survey’) are featured throughout this report, to provide insights from transportation electrification stakeholders.

The survey was anonymous, but participants were asked to identify their industry type. A total of 18 (38%) respondents were electric utilities, including 18.8% investor-owned utilities, 14.6% public power utilities, and 4.2% electric cooperatives. Of the 30 non-utility respondents, technology equipment manufacturers represented 12.5%, followed by government and integrator/engineering firms representing 8.3% respectively. There were a large number of “Other” responses, which included media, non-profit organizations, consulting services firms, and EV load management program operators. Survey results are available upon request via research@sepapower.org.

SEPA Utility Transformation Challenge Transportation Electrification Survey

SEPA launched the 2020 Utility Transformation Challenge, the most comprehensive assessment of U.S. electric utilities’ efforts to embrace the transition to a carbon-free energy future. The SEPA Utility Transformation Challenge included a Transportation Electrification survey (among others), and was distributed by SEPA to hundreds of U.S. electric utilities between April and June 2020. Participants completed the survey via a Qualtrics online survey platform. The survey asked utilities to respond to 12 questions addressing their transportation electrification teams, programs, activities, goals, challenges and barriers. These survey results are included in this report and heretofore referred to as the Utility Transformation Challenge survey. A total of 113 utilities...
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responded to the survey (through June 24, 2020), with investor-owned utilities representing 68%, public power utilities representing 16%, and electric cooperatives representing 16%.

Executive Summary

Utility electric vehicle (EV) charging infrastructure programs are growing in number and scale around the globe—and particularly in the United States—to support the projected growth of transportation electrification. Many U.S. state policies developed to improve air quality or reduce greenhouse gas emissions rely heavily on the transition of light-, medium-, and heavy-duty vehicles from internal combustion engines to electric propulsion. Market factors driving EV adoption include the increase of vehicle availability, range and battery capacity, as well as vehicle price reductions. Bloomberg New Energy Finance projects that by 2040, EV charging will lead to an 11% increase in total U.S. electricity consumption—one of the highest increases in the world.1 To support this growth, large-scale deployment of EV charging infrastructure will be required.

Proactive Utility EV Programs Are Key

Some utilities are taking a lead role in facilitating this EV transition, and those that are not should consider how their infrastructure planning will be shaped. According to Atlas EV Hub, which tracks U.S. transportation electrification regulatory filings by investor-owned utilities, as of April 2020, almost $3 billion in transportation electrification investments have been approved or are pending approval by state utility commissions.2 The majority of the filings address EV charging infrastructure programs to support projected EV growth. A total of 80 filings have been approved for 45 utilities in 26 states, with an investment of $1.5 billion. Another 30 filings are pending approval for 24 utilities in 23 states, with investment requests of $1.4 billion.3 Program trends indicate that such filings increasingly focus on medium- and heavy-duty EV charging infrastructure.

Power requirements for early-stage heavy-duty EV charging can be up to one megawatt nameplate capacity per charger and will exceed that level as battery, vehicle and charging technologies evolve. These power requirements may drive upgrades beyond the transformer to the substation; substation upgrades require a lead time of up to four years for planning, permitting and construction.4 These needs will present steep challenges to utilities and long delays for customers in the absence of proactive planning. A positive customer experience depends heavily on how quickly and efficiently utilities can help their customers install EV charging infrastructure.

The most successful utility EV programs are implemented by utilities that have a strong transportation electrification team; have guidance of an EV strategic plan; make the customer experience a priority; and incorporate EV equity, standards and interoperability. Most utility EV charging programs begin with residential and workplace offerings, and then expand to medium- and heavy-duty commercial fleets, such as those operated by municipalities, transit agencies, delivery companies and schools that are replacing aging vehicles.

A Strong Team with a Strong Plan Creates Success

The best EV strategic plans help utilities first define where they are going, and then map out the best way to get there. They include EV and EV charging objectives for residential and commercial customers, address how to streamline the decision-making process, prevent silos, reduce costs, improve the customer experience, and incorporate best practices for planning, permitting, construction and interconnection processes. Best practices in understanding how to overcome EV infrastructure challenges include:

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- Conducting research on the current and projected market conditions in a utility’s service territory, including factors outside of the utility’s control (e.g., EV incentives and availability).
- Assessing grid impacts, including geo-segmentation of the market, where fleet depots are located and the routes they travel, and the regions that are more likely to see EV clustering.
- Defining the utility role in working with customers and creating business opportunities.

To maximize the success of their EV initiatives, utilities should develop a strong transportation electrification team that works cross-functionally to leverage the skills of internal departments to assist with program deployment and customer engagement. The transportation electrification team should help lead this alignment as the program is built, launched, and implemented. Coordinating with internal departments that can help exponentially grow customer engagement is often an effective investment of resources. These departments can include Customer Research for segmentation data, Customer Communications for marketing strategy development, Public Affairs for outreach to municipalities and permitting departments, Commercial Account Managers to target fleet owners, and Community Relations to create EV education and outreach partnerships with community-based organizations and their stakeholders.

The smaller the team, the more important it is to cultivate relationships with internal departments and collaborate with them to reach program goals. Smaller teams should include an EV charging infrastructure expert and education and outreach manager. Medium-size teams should add experts to develop regulatory filings. Larger teams should include a program manager, a sales team, a construction project manager, a medium- and heavy-duty EV expert, and a financial analyst. Examples of each size team are highlighted in this report with case studies from Orlando Utilities Commission, Austin Energy, and Southern California Edison.

Prioritize the Customer Experience

Based on SEPA’s 2020 Utility Transformation Challenge survey, utility-led EV charging infrastructure incentives (e.g., electric vehicle supply equipment (EVSE) rebates and make-ready infrastructure programs) are among the most popular utility EV program options. While multiple options exist for structuring EV charging infrastructure programs, successful execution requires five key implementation steps as listed below. Each step has corresponding best practices for creating a successful EV charging infrastructure program. The best plans consider how the customer experience is impacted for each step.

- Planning should include site prioritization, customer segmentation, internal and external process development, and customer experience development.
- Customer engagement includes a marketing strategy and a process for providing transparency to the sales team so it can quickly assess which stage of the program a customer is in.
- Evaluation includes a process to efficiently evaluate participant applications, as well as perform site feasibility reviews.
- Design and construction considers optimal service drop locations, federal Americans with Disabilities Act (ADA) guidelines (for public charging), and streamlined permitting.
- Following up with customers after EV chargers have been installed helps the utility team understand how well the customer navigated the program and where process improvements are needed.

This report lists utility-led and third-party EV infrastructure program best practices that will help a utility develop successful processes.

Partner Proactively on Policy

Policy considerations include extending EV resources and benefits to low-income and underserved customers, and ensuring there is an equitable distribution of charging access for all customers. EV charging is an emerging land-use application for which few authorities having jurisdiction (AHJs) have developed permitting precedents. As a result, regulations and processes vary widely across jurisdictions, increasing development timelines, complicating standardization, increasing litigation risks for EV charging site hosts, and increasing costs. Utilities have a strong role to play to help smooth this process in their service territories. In addition, standardization and interoperability are critical considerations for utilities and stakeholders in the development of charging infrastructure, creating positive customer charging experiences with EV drivers, and supporting competition and innovation in the market for EV charging products and services.
What's in the Report

This report describes how utilities can develop an EV strategic plan, build strong transportation electrification teams, and create successful EV charging infrastructure programs that result in a positive customer experience and successful deployment. A complete list of topics is included in Table 1.

Table 1: Report Overview

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Developing Utility EV Strategic Plans</td>
<td>This section outlines the development and composition of EV strategic plans that evaluate a utility’s complete EV and EV charging objectives, and presents a list of “must do,” “should do” and “could do” actions for utilities to consider. It also includes case studies describing the development of EV strategic plans by Portland General Electric and National Grid.</td>
</tr>
<tr>
<td>Building a Utility Transportation Electrification Team</td>
<td>This section discusses reasons utilities should develop a transportation electrification team and the departments typically involved. It addresses potential staffing approaches for utilities of different sizes, and presents results from a SEPA survey assessing team development and activities. It also includes case studies from Orlando Utilities Commission, Austin Energy, and Southern California Edison describing the creation of transportation electrification teams.</td>
</tr>
<tr>
<td>Best Practices for Utility-Led EV Charging Infrastructure Programs</td>
<td>This section discusses best practices for utility-led EV charging infrastructure programs in the areas of program planning, customer engagement, site evaluation, project design and construction, and customer and regulatory follow-up. It includes a case study of Puget Sound Energy’s Up &amp; Go Electric program.</td>
</tr>
<tr>
<td>Best Practices for Third-Party Charging Infrastructure Interconnection</td>
<td>This section discusses best practices for the deployment of customer-side EV charging infrastructure and the utility’s role in internal planning, customer engagement, and design and construction.</td>
</tr>
<tr>
<td>Policy Considerations</td>
<td>This section provides recommendations to encourage EV deployment in low-income and underserved communities, the need for standards and interoperability, and state and local permitting processes considerations.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>This section identifies the report’s recommendations to improve utility EV charging infrastructure program rollouts.</td>
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<tr>
<td>Appendix</td>
<td>An electric service evaluation template for electric fleets.</td>
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1) Introduction

Electric utilities across the United States have developed transportation electrification infrastructure programs for a variety of reasons, including compliance with state policies to reduce greenhouse gas emissions, meeting the electric vehicle (EV)5 charging needs of their customers, positioning themselves as industry leaders, and exploring new revenue opportunities.

In October 2019, the Smart Electric Power Alliance (SEPA) Electric Vehicle Working Group, Distribution Planning Subcommittee published a report titled “Preparing for an Electric Vehicle Future: How Utilities Can Succeed,“6 which described how utilities could overcome barriers by taking a proactive role in the planning and deployment of EV charging infrastructure. The report identified utility approaches to remove process bottlenecks, increase EV

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5 For the purpose of this report, the term “electric vehicles” (or “EVs”) means light-duty, medium-duty and heavy-duty on-road electric vehicles.

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adoption, increase system utilization and efficiency, and boost revenues by improving customer engagement, effectively leveraging internal resources, and taking advantage of new business models.

This second Subcommittee report builds on that work by documenting utility best practices for EV charging infrastructure programs implemented over the last five years. Utility approaches to developing internal EV charging infrastructure processes and strategies will vary depending on state and local market conditions, regulatory environment and governance structure, customer segmentation, geographic location, and available resources. Utilities at every stage of their EV journey can leverage lessons from strong EV markets to minimize problems, improve efficiency and effectiveness, and maximize the growth of EV charging infrastructure.

Another SEPA report, “Utilities and Electric Vehicles: Evolving to Unlock Grid Value,” described three major stages of utility programs and activities:

- Early-stage utilities are learning about EV technologies and are focused on customer and staff education. As shown in Figure 1, early-stage utilities typically have two types of programs: basic customer education and utility-facing activities.
- Intermediate-stage utilities are more actively engaging with their customers and are incentivizing market growth. These utilities typically have four types of programs: incentives, utility EV business models, behavioral load management programs, and electric vehicle supply equipment (EVSE) support activities as highlighted in this report.

Figure 1: Utility Transportation Electrification Programs by Stage

<table>
<thead>
<tr>
<th>Early Stage</th>
<th>Intermediate Stage</th>
<th>Late Stage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic Customer Education</strong></td>
<td><strong>Incentives</strong></td>
<td><strong>Active Load Management</strong></td>
</tr>
<tr>
<td>Utility website content</td>
<td>Low- and moderate-income customer assistance</td>
<td>Direct load control—active managed charging</td>
</tr>
<tr>
<td>Utility customer outreach (e.g., social, mailers)</td>
<td>EV/EVSE incentives</td>
<td>Vehicle-to-everything (V2X) (e.g., V2G, V2B, V2H)</td>
</tr>
<tr>
<td>Utility-Facing Activities</td>
<td>Utility-owned EVSE/EV programs</td>
<td>Behavioral Load Management</td>
</tr>
<tr>
<td>Utility-owned/managed fleet EVs</td>
<td>Utility hosted/sponsored ride-and-drive events</td>
<td>EV-specific TOU rates</td>
</tr>
<tr>
<td>Utility employee workplace charging programs</td>
<td>Behavioral load control programs</td>
<td>Commercial demand charge management programs</td>
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<tr>
<td>Utility employee EV rebate programs</td>
<td>Commercial demand charge management programs</td>
<td>Utility EV Business Models</td>
</tr>
<tr>
<td>Develop utility EV strategic plan</td>
<td>Electricity cost-management services</td>
<td>Electricity cost-management services</td>
</tr>
<tr>
<td>Develop a Transportation Electrification team</td>
<td>Utility-owned/sponsored co-location of DERs for EVSE</td>
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</table>

**EVSE Support Activities**
- Publish EVSE interconnection guidelines
- Publish hosting capacity maps for EVSE
- Dedicated technical support teams
- Integrate EV forecasts with IRPs and DRPs


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Late-stage utilities are actively leveraging EVs for grid benefit through direct load control activities—primarily managed charging and vehicle-to-everything (e.g., vehicle-to-grid, vehicle-to-home).

These programs and activities are most effective when they are designed specifically to meet the unique needs of particular customer segments, including residential, commercial, fleets, multi-unit dwellings, workplace, and public/retail.

According to the results of the SEPA 2020 Utility Transformation Challenge survey, a common utility transportation electrification program (after utility websites and customer outreach programs) is an incentive program that supports the growth of EV charging infrastructure. The three most common types of utility-led charging incentives are EVSE rebates, contributions in aid of construction, and make-ready charging infrastructure programs (see Figure 8). Utilities often focus on infrastructure deployment because it is commonly cited as one of the largest barriers to EV deployment, and utilities have the expertise and resources to deploy large infrastructure rollouts. With billions of dollars of charging infrastructure being installed in the United States, it is critical that the utility industry collectively share best practices to quickly and efficiently build out a charging network.

While this report is written for an electric utility audience, it can also serve as a resource for non-utility stakeholders seeking to understand and help improve utility processes for EV charging infrastructure programs. It presents numerous best practices, which are distilled from the experiences of the report’s authors, as well as information gathered from utilities, EVSE providers, and other EV stakeholders. It includes the results of two EV surveys. See the “About the Report” section for further details.

Utility-Led vs. Customer-Side

In this report, we differentiate between “utility-led” EV charging infrastructure programs and “customer-side” EV charging infrastructure projects. Utility-led EV programs are distinct programs designed and implemented by utilities, whereas customer-side projects are deployed independently of any utility-led programs. Customer-side projects can include third-party EV charging infrastructure interconnection. Additional clarification is provided in Sections 4 and 5.

2) Developing a Utility EV Strategic Plan

Developing a comprehensive strategic plan helps a utility define the goals and objectives for any EV program and compiles necessary information in one place. This document serves as a tool for internal and external communication about priorities and investments. It also provides transparency to stakeholders and justification for activities.

Utilities around the United States, including National Grid and Portland General Electric (both featured in case studies below), have developed EV strategic plans that include EV and EV charging objectives for consumers and businesses, and that address education and planning. EV strategic plans specify internal restructuring to better streamline decision-making processes, reduce costs and prevent information silos, while also improving the internal processes for utility-led EV charging infrastructure programs and interconnecting customer-side EV infrastructure.

According to the 2020 SEPA Utility Transformation Challenge survey (see Figure 2), 42% of the utility respondents were in the process of developing a strategic plan for transportation electrification, with 90% of those doing so voluntarily (i.e., they were not required to do so by a government authority). Fifty-one percent had already developed a strategic plan for transportation electrification, with 85% having done so voluntarily. Only 5% of utility respondents indicated they had not developed a strategic plan and were not currently developing one.

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8 See the “About the Report” section for additional details.
10 For the purpose of this report, the term “interconnection” is used to define the installation and energizing of all customer-sited distributed energy resources (DERs). While “service connection” may better describe the installation and energizing of customer-sited EV charging equipment due to its one-way power flow, “interconnection” is used in future-use context, where EV charging equipment could facilitate two-way power flow (e.g., vehicle-to-grid).

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All electric utilities should begin planning today to accommodate the impacts and to achieve the benefits of EV adoption and EV charging infrastructure deployment. Strategies will vary by utility business readiness and local market conditions. The sections below lay out a number of options to consider when approaching an EV strategic plan, ranging from consumer education to a full EV strategy with large internal teams dedicated to transportation electrification.

Components of a Utility EV Strategic Plan

One best practice is to determine how to tackle EV infrastructure challenges in the broader context of existing local markets, policies and regulations, as well as available utility resources. Accordingly, a utility EV strategic plan typically includes two major components:

1. Market Research and Needs Analysis

U.S. utilities are subject to the EV market conditions in their service territories. While these conditions can be created and driven by factors outside of a utility’s control (e.g., policies to incentivize EV adoption and automotive manufacturer decisions regarding vehicle distribution), a utility can take several steps to understand the local market and potentially improve EV market conditions. An initial step is to understand the state of the current and future market for EVs and EV charging infrastructure in and around the utility’s service territory. This analysis should include an assessment of grid impacts (e.g., geo-segmentation of the market to understand potential regions for clustering, potential fleet market, potential need for workplace and public charging); an assessment of the benefits of transportation electrification (to the utility in particular); an assessment of key market drivers (e.g., federal, state, and local policies and initiatives that impact EV market deployment); and an assessment of which utility actions and programs can help support them.

2. Define the Utility Role in the Market

Once EV market conditions are understood, the utility should define its intended role in the EV and EV charging market.11 For example, what must the utility do for its customers, and what are the business opportunities? A compilation of possible “must do,” “should do,” and “could do” actions is presented below.

**“Must Do” Actions:**

- Be a trusted resource for customers. Ensure the utility can respond to customer requests for information in an organized and timely fashion. This could range from identifying an EV subject matter expert lead to establishing a dedicated transportation electrification team within the utility.
- Capture data on EV purchases, EV leases, and EVSE installations.
- Process EVSE interconnection requests and manage any required system upgrades expeditiously.
- Be responsive to commercial, industrial and institutional EV investments, and serve as a neutral advisor.

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11 Regulated utilities should further understand their particular role within a competitive marketplace and how to address potential stakeholder concerns.
Incorporate EV adoption and charging infrastructure into forecasting, planning (including integrated resource planning), and operations functions.

“Should Do” Actions:
- Provide a dedicated EV resource website for customers.
- Provide access to qualified equipment through a marketplace, rebate-based or turnkey program, to ensure high-quality EVSE deployments and to improve the likelihood of system visibility and the potential for managed charging.
- Provide EV load management programs and solutions to customers, such as direct load management and indirect EV-specific rate design approaches.
- Create community and stakeholder partnerships to enable EV education and promotion.
- Work with authorities having jurisdiction (AHJs) to develop clear and streamlined permitting requirements for customer-side EVSE.
- Create customer journey maps for residential EVs and EV fleets.
- Evaluate the distribution system using locational forecasts to determine feeders with possible limited capacity for charging networks and assess impacts that could lead to transformer replacement.
- Publish EVSE hosting capacity maps, alongside solar hosting capacity maps. These loads may interact, so developing a distribution resource plan is a valuable process to consider even if not mandated.
- Incorporate equity and environmental justice concerns for disadvantaged communities into the process of planning, deploying, investing in, operating and providing service for EV charging infrastructure, to ensure that the benefits of transportation electrification are shared among all customers.

“Could Do” Actions:
- Develop a benefit-cost analysis for utility programs for EV and EVSE-related investments.
- Provide access to a network of preferred vendors (equipment and/or services).
- Offer make-ready services for residential, commercial, industrial and institutional customers.
- Offer incentives for EV chargers across a variety of market segments.
- Install and maintain utility-owned, public EVSE in critical locations on utility easements or at host sites.
- Install and maintain utility-owned EVSE for fleet, multi-unit dwelling (MUD) and workplace charging, and in underserved communities at host sites.
- Offer EVSE as a service to residential and commercial customers.
- Provide on-bill financing and turnkey solutions to address issues of cost and complexity, if not offering a full utility-owned-and-operated solution to customers.
- Provide guidance on the development of standards for EVSE and managed charging.
- Develop a customer engagement strategy.
- Determine the most appropriate forecasting and utility planning processes.
- Create a transportation electrification team that addresses which employees are responsible for implementing the plan (more details in Section 3).
- Define clear processes for interconnecting, operating and maintaining utility-led EVSE (more details in Section 4).
- Define clear, transparent processes for interconnecting customer-owned and third-party-owned EVSE (more details in Section 5).

Case Studies: Utility EV Strategic Plans

Case studies describing two investor-owned utilities’ journeys to prepare for and manage EV growth are presented on the following pages:
- Portland General Electric
- National Grid

For these case studies, report authors interviewed staff from Portland General Electric and National Grid to examine their approaches to developing an EV strategic plan in their service territories in Oregon and the Northeastern United States, respectively, as well as outcomes and lessons learned during that process.

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Case Study: Portland General Electric

Ev Strategic Plan

Portland General Electric (PGE), a fully integrated investor-owned utility based in Portland, Oregon, serving 899,000 customers, is one of the top-five U.S. markets for EV drivers. In recent years, PGE has launched several initiatives aimed at supporting customers’ transition to electric fuel, and has made significant strides towards being more aware and responsive to customer needs related to transportation electrification and charging. PGE has developed strategic roadmaps for an integrated, cross-company effort to deliver efficient support to this new market channel. The authors interviewed Andy Eiden, Senior Planning & Strategy Analyst at PGE, to better understand PGE’s process of developing and adopting an EV strategy.

Identifying Its Role in the Market

PGE has a critical role to play in supporting the rapid, safe, affordable, equitable, and clean deployment of EVs in Oregon. Because PGE operates in a state with aggressive climate goals and a zero-emission vehicle (ZEV) goal of 250,000 registered ZEVs by 2025, the utility is facilitating frictionless interconnection between its system, customer vehicles, and charging stations. In the quickly evolving EV market, PGE continues to evaluate its role, and to plan “used and useful” investments to support transportation electrification, including among emerging sectors. For example, fleet owners across PGE’s service territory are also gearing up for accelerated deployment of EVs, from municipal segment customers, to private business and public transit agencies. Furthermore, PGE understands that effective engagement with its customers, its stakeholders, and other partners is a critical and necessary step to becoming a consensus builder within the market. Because the PGE system is networked, used, and leveraged by its customers, PGE is unique among other EVSE providers in its ability to capture various benefits from EV adoption. In order to do this, PGE must remain flexible and quickly identify solutions to address the challenges in serving new EV loads.

PGE’s Strategy

Amid such a dynamic market and regulatory landscape, PGE laid out a comprehensive strategy in its Transportation Electrification Plan (approved in 2020 by state regulators) that aims to drive overall customer benefit and minimize costs of integrating this new load. Three key areas of focus are:

- **Developing meaningful rate options** for EV drivers to reduce fueling costs and complexity;
- **Supporting infrastructure deployment**, including behind the meter investments, to ensure charging adequacy; and
- **Creating new customer programs** to efficiently integrate new EV loads into the grid.

PGE’s goal is to ensure easy access to a robust network of EV infrastructure and supporting programs that meet customers where they are, recognizing there is no one-size-fits-all approach. PGE has focused efforts on developing new approaches to serving customers and eliminating customer friction wherever possible. To date, areas of focus have included:

- **Transit and fleet electrification**
- **Expanding charging access for EV drivers**
- **System planning and customer readiness**

PGE’s work in transportation electrification must also be viewed as part of developing the integrated grid of the future. Doing so involves developing better tools for forecasting adoption, collaborating with customers to create fleet electrification plans, accelerating grid impact studies, and future-proofing site design with an eye toward the evolving charging needs of each customer. PGE is

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13 The “used and useful” principle is widely used by state regulatory commissions for determining the costs an electric utility is allowed to recover from customers or ratepayers. It requires a utility’s assets to be physically functioning (used) and useful to customers before they may be required to pay the costs associated with those assets.

developing new methods of evaluating customer and grid benefits related to EVs, in addition to targeting traditional considerations of system cost and reliability. While PGE has positioned itself to support the accelerated growth of the EV market, it is committed to meeting customers’ needs for reliable, affordable, and clean service. According to Andy Eiden, “The opportunity to electrify transportation is clear, but there are associated challenges related to ensuring we make the best use of the distribution system and expand its capabilities in a cost-effective way. We aim to tackle both of these in stride and stay ahead of the curve.”

**Milestones Achieved**

To date, PGE has achieved milestones critical to the progress of its transportation strategy. Examples include:

- **Deployment of Public Charging infrastructure.** Through funds approved by state regulators, PGE made investments in public charging backbone infrastructure to support customers’ charging needs and better understand charging patterns and utilization. Under this effort, PGE installed seven fast-charging sites across its service area, each with at least four DC quick chargers with universal accessibility—CHAdEMO and Society of Automotive Engineers (SAE) Combo plugs—as well as Level 2 chargers.

- **Electrified Mass Transit Pilot Program.** Working with the regional transit provider, TriMet, PGE successfully implemented charging for five electric buses serving a fully electrified, 100% wind-powered route—the first in the nation. PGE installed a depot charger (150-kW charger with two ports) and an on-route overhead charger (450 kW) capable of providing a bus with adequate charge within 10 minutes. PGE continues to work closely with TriMet to plan potential future developments as more of its fleet converts to electric fuel.

- **Technical Support for Customers Across Market Segments.** PGE continues to identify its customer types based on EV and business needs. PGE has a full-time technical outreach specialist who serves as the external face for customers to learn about PGE’s transportation electrification offerings and engage in partnership discussions, and also combines this with diverse marketing and outreach strategies to reach customers with pertinent information. By proactively engaging customers in planning for fleet electrification and charging deployment, PGE is also gaining insights on where to expect future EV loads on the distribution system.

- **Drive Change Fund.** In order to promote equitable access to electric transportation options, PGE awarded $2.25 million to 16 community-based organizations under the PGE Drive Change Fund program. The program, funded by the sale of Oregon Clean Fuels Program credits, is available to non-profits and community-based organizations accelerating electric transportation options for Oregonians. Successful projects provided a community benefit, and preference was given to projects that met the needs of underserved communities.

- **School Bus Electrification Pilot.** PGE is increasing access to electric transportation for Oregon students through a pilot program supporting five school districts in its service area with electric school buses and related infrastructure, anticipated to be on the road by early 2021.

PGE’s experience can be used to help inform other utilities’ transportation strategies and execution. Core to its approach, PGE has emphasized strategic planning prior to any specific program rollouts. As PGE explores future transportation electrification activities, it understands that as a utility, it must continually evaluate its role within the transportation market and remain ready to meet evolving customer needs as it develops and launches new offerings.
Utility Best Practices for EV Infrastructure Deployment

Case Study: National Grid

EV Strategic Plan

Like PGE, National Grid has launched a customer engagement initiative to support EV adoption across its U.S. electric service territories. National Grid manages operating companies in three states—Rhode Island, Massachusetts and New York—each with a diverse customer base, local market conditions, and regulatory environment. While the three states have similar goals, National Grid’s customer-facing programs are different in each jurisdiction. National Grid has used that heterogeneity as an opportunity to identify lessons learned in one state and rapidly apply them in that state and its other operating jurisdictions.

Identifying Its Role in the Market

Transportation accounts for more than 40% of greenhouse gas emissions in the Northeastern United States. Additionally, all three states in which National Grid operates have aggressive climate action goals and are signatories of the Multi-State ZEV Memorandum of Understanding (MOU) goal to deploy at least 3.3 million collective ZEVs by 2025. National Grid’s customers have told the company that while they want to electrify, they face significant barriers to EV adoption. Many residential customers worry that there is not enough charging infrastructure to get them where they need to go, and many commercial fleets are unsure how to tackle the new logistical challenges that electrification of fleet vehicles would bring. National Grid has undertaken extensive work through strategic planning, customer surveys and journey mapping exercises, as well as engaging with stakeholders to understand how the company can best help its customers and states achieve these goals. Through this work, National Grid identified that it has a key role to play in enabling and deploying affordable EV charging infrastructure, increasing customer education and awareness, and offering other related services to ensure robust and equitable access to the benefits of transportation electrification.

Strategy

To achieve these goals, National Grid has designed and launched its first phase of EV charging infrastructure programs in all three states. It has deployed these programs at different times, and it therefore has been able to actively seek and incorporate lessons learned from the states in which programs were deployed first to better inform program design for the states in which programs were deployed later. To ensure a comprehensive and equitable approach, the National Grid has focused on the following types of programs to date:

- **Residential:** Off-peak managed charging programs.
- **Commercial:** Level 2 and DC fast charging (DCFC) make-ready infrastructure programs.
- **Fleet (including medium- and heavy-duty vehicles):** Fleet advisory services.

National Grid has also undertaken marketing and outreach campaigns to increase awareness of its programs and the benefits of EV charging for the above customer segments.

Key Milestones Achieved

To date, National Grid has received regulatory approval for EV programs in all three service territories. It has also achieved several key milestones on its path toward helping the states in which it operates achieve their transportation electrification and climate goals.

Rhode Island

National Grid’s program in Rhode Island—one of the company’s first such programs—has provided valuable insights for program design in other states. For example:

15 See [https://www.zevstates.us](https://www.zevstates.us) for details regarding the Multi-State ZEV MOU.
National Grid has deployed make-ready infrastructure funding for a wide range of customer segments and found that workplaces have shown some of the strongest interest in charging station adoption, over-subscribing the allocated segment funding within the first 18 months of the program.

National Grid's Residential Off-Peak Charging Program and Fleet Advisory Services (designed to provide fleet customers with a roadmap to electrification while ensuring the company can adequately prepare for associated infrastructure needs) have garnered strong interest.

National Grid's DCFC program is in its second year. Initial interest was quite low. According to Rachel Flynn-Kasuba, Manager of New Product Development for Clean Transportation Solutions at National Grid, “Upfront cost to the customer was a leading cause of the slow enrollment in National Grid’s DCFC program in Rhode Island. However, once the state launched their Electrify Rhode Island Program utilizing Volkswagen Settlement funds to provide rebates for the cost of the EVSE, we saw a significant increase in DCFC applications. Addressing the upfront cost is a key factor in increasing charging station deployment.”

Massachusetts

National Grid has drawn lessons learned from Rhode Island to inform its programs in Massachusetts. For example:

- Based on customer interest in the Rhode Island Residential Off-Peak Charging Program, National Grid has scaled that program in Massachusetts to up to 11,000 customers.

- Based on customer interest in the Rhode Island Fleet Advisory Services Program, National Grid has scaled that program in Massachusetts to 100 public and government customers.

- Building on lessons learned in the Rhode Island DCFC segment, National Grid is working with partners and key stakeholders to identify how best to deploy fast chargers in Massachusetts.

New York

In New York, National Grid is nearing completion of its initial program and is in discussions regarding the next phase of its EV program in conjunction with key partners and emerging regulatory requests. In particular:

- National Grid exceeded its initial program goals ahead of schedule by closely collaborating with trade allies and vendors. To date, it has deployed nearly 1,000 L2 ports, compared to an initial goal of 490 ports.

- By coordinating closely with industry stakeholders and partner utilities, National Grid is working to respond to guidance from the New York Department of Public Service Staff to deploy charging infrastructure at scale to help the state achieve its ZEV MOU goals.

- National Grid is actively drawing upon lessons learned in both Rhode Island and Massachusetts to ensure new programs are designed as effectively as possible, to maximize customer benefits.

National Grid’s experience can be used to inform other utilities with operating companies in multiple states. The absence of such guidance can lead to out-of-phase program design, filing and launch, which can make it more complicated to manage and scale the programs. National Grid was able to navigate this challenge by following steps to understand the regional EV market and unique customer needs, and then develop strategic business plans that spanned their multiple states. Ultimately, National Grid was able to improve the design of similar EV programs in adjacent regulatory environments through an iterative process and by sharing best practices across its service territories.
3) Building a Utility Transportation Electrification Team

Why Utilities Need a Transportation Electrification Team

The most successful utility EV program efforts are those that work cross-functionally to leverage the skills of internal departments to assist with customer engagement. A transportation electrification team can facilitate internal alignment and leadership as a program is built, launched, and implemented. A list of utility departments and how they can support EV charging infrastructure programs is featured in Table 2. Regardless of the team’s size, these departments can act as an extension of the team to more broadly distribute the EV charging program messaging into their business practices. This will help grow customer engagement.

Meeting with these departments early in the program’s development will help determine and prioritize what organizational resources the transportation electrification team can leverage and what resources it should build within the team.

Although a dedicated cross-functional transportation electrification team is the gold standard for utilities in terms of improving EV infrastructure planning and deployment processes, it is not always feasible for a utility to establish such a team. Smaller utilities with limited EV deployment in their service territories might not be able to justify the resources needed to address EV charging infrastructure. Therefore, it is important to understand the functionality of a utility’s departments and how they can be leveraged to grow the program’s reach without the need to increase staff in the short term.

Prior to creating a dedicated transportation electrification team, utilities can support EV and charging infrastructure growth by:

- Designating a lead point of contact for EV infrastructure customers (usually one employee serves in this role part-time in addition to his or her primary job).
- Establishing a full-time EV program manager position that guides EV infrastructure program activities across all departments.
- Hiring a contractor to manage EV program activities, such as tracking customer progress from sign-up to installation, or performing site walks.
- Establishing a separate interconnection queue for charging infrastructure projects, so projects are prioritized appropriately.

When a utility is ready to form a dedicated transportation electrification team, there are many ways to structure the team. The sidebar describes potential approaches to staffing such a team as it grows from small to medium to large.

<table>
<thead>
<tr>
<th>Table 2: Utility Departments Involved in EV Charging Programs</th>
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<tbody>
<tr>
<td><strong>EV Project Management Team</strong></td>
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<tr>
<td>Guides and facilitates internal and external rollout of EV programs and activities.</td>
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<tr>
<td><strong>Strategy</strong></td>
</tr>
<tr>
<td>Helps to develop the programs and activities undertaken by the utility via an EV strategic plan. Also oversees the development of new utility business plans.</td>
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<tr>
<td>Department</td>
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<tr>
<td>Rate Design</td>
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<td>Public Affairs</td>
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<td>Construction</td>
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<td>Technology &amp; Innovation</td>
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Potential Staffing Approaches for Transportation Electrification Teams

There are many different ways to build utility teams to successfully manage EV infrastructure projects. Utilities often have dedicated transportation electrification teams consisting of two to 10 (and sometimes more) members. The importance of a dedicated team, regardless of size, is that utility staff are responsible and accountable for EV infrastructure activities, serve as the go-to resource(s) and expert(s), and are dedicated to expanding infrastructure in their communities.

A best practice for utility EV teams is to be able to leverage key internal departments that can help make the EV program successful. Below are examples of different potential utility staffing approaches.

**Smaller Team: Two Team Members**
- **EV Team Manager/Director**: EV charging infrastructure expert working with management to guide the EV strategy. Attends events and participates in trade organizations to learn best practices, and leads regulatory efforts. Works cross-functionally with management to leverage the expertise of key departments that can help move the EV strategy forward, as discussed in Table 2.
- **Education and Outreach Manager**: Leads the education and outreach portion of the EV strategy. Works cross-functionally to provide key departments with the needed materials for their stakeholder and customer outreach efforts. Oversees implementation of the marketing plan, which could include customer journey mapping, EV test drives, dealership outreach, internal employee education, and website development.

**Medium-Size Team: Five Team Members**
*Same two team members as above plus* a growing focus on developing a sales and operations team for EV charging program implementation.
- **EV Charging and Infrastructure Expert**: Focuses on the development of successful utility EV charging and infrastructure programs for regulatory filings. Creates RFIs, RFQs and RFPs, and works with charging vendors to understand available technology.
- **Regulatory Manager**: Focuses on drafting EVSE program design elements for regulatory filings.
- **Education and Outreach Support Manager**: Supports the Education and Outreach Manager to implement the marketing plan, and to oversee EV test drives, dealership outreach and internal employee educational events.
- **Program Manager**: Develops the sales strategy for an EV charging program. Oversees team members, bringing in sales and working cross-functionally with other departments to ensure consistent program messaging and that departmental sales goals are met.
- **MD/HD Charging Infrastructure Expert**: Focuses on developing medium- and heavy-duty charging infrastructure programs. Works with charging vendors to understand available technology, and works with the regulatory manager to create new program filings.
- **Financial/Regulatory Analyst**: Focuses on regulatory filings and program financials, including revenue and business model analysis, as well as environmental impacts.

**Larger Team: Ten or More Team Members**
*Same five team members as above plus* a growing focus on developing a sales and operations team for EV charging program implementation.
- **Construction Project Manager**: Works with procurement, operations and construction departments to manage charging inventory and creates customer EV charging infrastructure construction schedules.
- **Program Manager**: Develops the sales strategy for an EV charging program. Oversees team members, bringing in sales and working cross-functionally with other departments to ensure consistent program messaging and that departmental sales goals are met.
- **Sales**: It is not typical for utilities new to EV charging programs to operate sales team members. However, when implementing such programs, the role is in fact similar to a sales role, and the goal is to help meet the program’s key performance indicators through program enrollment.
- **Construction Project Manager**: Works with procurement, operations and construction departments to manage charging inventory and creates customer EV charging infrastructure construction schedules.
- **MD/HD Charging Infrastructure Expert**: Focuses on developing medium- and heavy-duty charging infrastructure programs. Works with charging vendors to understand available technology, and works with the regulatory manager to create new program filings.
- **Financial/Regulatory Analyst**: Focuses on regulatory filings and program financials, including revenue and business model analysis, as well as environmental impacts.

**Team Segmentation**: Consider, if appropriate, dividing responsibilities among team members by program type for fleet electrification, DCFC, and residential charging infrastructure programs.

17 Requests for Information, Requests for Qualifications, and Requests for Proposals.
Utility Practices

According to the SEPA 2020 Utility Transformation Challenge survey, 90% of utility respondents had established or were (at the time of the survey) developing a dedicated transportation electrification team (see Figure 3), which included designating employees from multiple departments tasked with addressing transportation electrification projects. Of those utilities with an established transportation electrification team, the average number of full-time equivalent (FTE) utility employees dedicated to working on transportation electrification issues, programs and/or projects was 6.6, with a median of 4.0. The range was wide, varying from one FTE to 48 FTEs. As shown in the scatterplot in Figure 4, applying a linear trendline resulted in approximately one full-time equivalent transportation electrification staff person per 108,000 customer meters, though there was not a significant correlation between staff and customer meters. This may be due to differences between utility EV program budgets and programs, which vary widely from state to state. SEPA will continue to investigate this question.

When asked which activities the utility’s dedicated transportation electrification team supports, the four most common responses were strategy; regulatory/rates; customer programs; and customer education, outreach, and marketing (see Figure 5). These and other highly ranked activities align closely with the recommended

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18 These figures do not include consultants, contractors or other temporary staff. N=48.
The authors would anticipate team functions to increase as EV programs become more diverse and sophisticated.

Case Studies: Utility Transportation Electrification Teams

Three case studies describing the development of dedicated transportation electrification teams by utilities of different sizes are presented on the following pages:

- Orlando Utilities Commission (OUC)
- Austin Energy
- Southern California Edison (SCE)

For these case studies, report authors interviewed utility staff to examine the context, history, development, evolution, lessons learned, and other insights related to the creation and roles of these teams.
Case Study—Smaller Team: Orlando Utilities Commission Transportation Electrification

The Orlando Utilities Commission (OUC), a municipally-owned public utility in Central Florida, has been exploring transportation electrification since 2009 by pursuing grants, customer education activities, and EV charger installation programs. Significant progress was made in 2018 when a formal task force was assigned to the topic. According to an interview with Peter Westlake, Manager of New Products and Services at OUC, and Eva Reyes, Project Engineer at OUC, before the team’s creation, OUC was able to install 165 charging stations using grant funding. However, without the focus of a dedicated team, OUC had difficulty gaining traction in pushing EV adoption, and the previous ad hoc method of operation was very slow.

OUC’s initial priority was to ensure adequate levels of charging infrastructure, and it designed the “Charge-It” program to offset high capital costs for customers. Under the program, OUC managed ownership, installation, and maintenance costs over a seven-year lease period. The program was developed over three years, as OUC staff were not assigned to the program full-time and only met monthly.

Developing the Electrification Program

Peter Westlake, the current manager of OUC’s Beneficial Electrification program, was tasked with identifying an effective structure for an electrification program. OUC then reviewed and approved the structure at the VP level, and an executive sponsor was identified. Team leads were then identified for each of the five program areas, and the selected team leads held strategic planning sessions to decide how best to organize themselves.

OUC’s Beneficial Electrification program was created to replace fossil-fuel-fired technologies and equipment with those fueled by electricity. Currently, the program’s priority is transportation, but it will explore other viable conversions in the future. The program’s five action areas are: (1) policy, (2) education, (3) rates, (4) infrastructure, and (5) adoption. Aside from three staff members, the majority of the team is filled by employees whose primary job is not electrification, but who are associated with the program and can provide specialization in various verticals.

Designating numerous staff to focus on electrification, even if only part-time, allowed OUC to make progress. The first year of the Beneficial Electrification program was dedicated primarily to analyzing priorities and strategy covering each of the five focus areas, and the team is now preparing to execute. According to Peter Westlake, without a transportation electrification team, OUC would still be developing a strategy.

Reasons Behind OUC’s Beneficial Electrification Program

1. Transportation electrification generates additional revenue for OUC. Since the majority of EVs in OUC’s service territory are charged overnight, which coincides with a typical valley in the utility’s load generation, existing generation assets can be used to handle the additional load. Aside from fuel, the revenue from the off-peak hours goes directly to OUC’s bottom line. Because OUC is a municipal utility, profits are returned to customers, and as adoption increases, this additional revenue puts downward pressure on OUC’s rates.

2. Conversely, transportation electrification can become a concern to a utility rather than an opportunity if not managed correctly. As DCFCs spread and adoption expands, utilities must stay ahead of grid planning to ensure sufficient infrastructure.

Through OUC’s e-bus program, some transportation partners are seeking to convert up to half of their fleet to run on electricity. For one partner, this represents 150 buses. These buses would represent a load equivalent to a substation wherever they land, which requires several years of planning to develop adequate infrastructure.

A utility cannot wait for a major commercial customer to announce electrification plans; it must stay ahead of these types of developments surrounding transportation electrification and their significant impacts on the grid. Even competitive bidding processes can be months in the making for an infrastructure project, so preparation for accommodating these large loads must be undertaken well in advance.
Utility Best Practices for EV Infrastructure Deployment

3. As a leader of transportation electrification in Central Florida, OUC feels well positioned to be a statewide leader and role model. It is critical for all stakeholders to be pushing for the right type of EV infrastructure, so that OUC’s customers have access to reliable charging infrastructure wherever they go, including neighboring service areas.

Leading by Example

OUC has chosen to pursue an EV future not only in the community, but also within the utility itself. OUC initially installed three charging stations dedicated to its employees, and it now hosts 30. Even with 30 chargers, OUC must schedule their usage, due to demand. OUC’s leadership also personally supports the utility’s electric vision, with members of senior management encouraged to own EVs.

Team Structure

The three dedicated staff members at OUC working on the Beneficial Electrification program are Peter Westlake, the team manager; an electrification specialist, which is a shared position between OUC and the Electrification Coalition (a non-profit organization); and an intern.

OUC Representation

The Beneficial Electrification program is currently based in OUC’s New Products and Services department, and many other OUC departments are represented and serve as active participants in transportation electrification. OUC’s Electrification Team departments include:

- **Policy** includes Legislative Policy and Legal staff.
- **Education** consists of Marketing/Communications staff and the Community Relations department, as well as staff from Internal Talent Development and Customer Service.
- **Rates** is part of OUC’s overarching “Power Shift” rates program.
- **Adoption** consists of Key Accounts, Customer Relations, and Marketing/Communications staff.
- **Infrastructure** primarily includes Transmission & Distribution and Emerging Technologies staff.

This group also works closely with Legal, Billing, Key Accounts, Customer Service, Marketing, IT, Operation & Construction, and Reliability staff for various aspects of projects, such as contract negotiations, custom art designed for customers’ charging stations, or evaluating connection requirements for charging stations.

External stakeholders include other subdivisions of the City of Orlando, other government agencies, and automotive dealerships.

Program Future

With the Beneficial Electrification program in its execution stage, OUC has established substantial future goals for each of the five focus areas, with a primary goal of raising EV penetration to 5%, which would represent 40,000 vehicles in OUC’s service territory by 2025. The goals include:

- **Policy** aims to capitalize on the Volkswagen settlement funds and explore EV-friendly policy.
- **Education** aims to conduct ride-and-drive events for up to 500 people over the next year and create additional unique digital and in-person activities.
- **Rates** will research time-of-use rates employed in advanced EV programs and establish rates designed to promote favorable charging behavior.
- **Adoption** aims to secure a commercial pilot, which would include evaluating the cost benefits of adoption.
- **Infrastructure** plans to nearly double the number of charging stations in OUC’s service territory. This includes 104 EV charging stations added by the City of Orlando and 65 stations added by Orlando International Airport.

Advice for Other Utilities

1. This is not a simple situation under which “if you build it, they will come.” OUC noted that it is rated one of the top five utilities for access to charging infrastructure, but this has not driven adoption. **Adoption will not occur without infrastructure, but merely installing infrastructure without education and policy will not drive adoption.** All components of electrification are important to reach a desired level of EV penetration.

2. When it comes to EV infrastructure, Peter Westlake believes that “a rising tide lifts all boats.” Infrastructure installed in one utility’s service territory also helps neighboring utilities promote EV adoption, as customers will be more comfortable in their ability to charge wherever they plan to travel. Because of this, utilities with less experience in EV infrastructure or fewer resources can especially benefit from reaching out to other utilities involved in transportation electrification or by joining in-state EV-focused organizations.
"I think the best job at Austin Energy is this job right here, Manager of Electric Vehicles and Emerging Technologies," asserts Karl Popham, elaborating that transportation electrification is "one of the most fun spaces that utility people can be in right now," and that it allows utilities to be more creative and explore new business models.

Since its inception in 2011, Austin Energy’s Electric Vehicles and Emerging Technologies team has chosen to be a leader in the field, rather than to be reactive to the rise of EVs. Being proactive and ahead of the curve has allowed Austin Energy to shape the conversation and governance around an emerging and potentially disruptive technology.

**Austin Energy believes that utilities without an EV team are “late to the party.”** For utilities without EV strategies, including smaller, rural utilities with fewer resources, it would be prudent to begin diverting resources to EV programs, as launches of several electric trucks and SUVs are planned. In addition to the opportunities EV involvement provides, a utility’s energy storage strategy is incomplete without an EV strategy because of the important connection that EVs have to utilities’ load management.

**Developing the Team**

The process of structuring the transportation electrification team was very ad hoc, since there was no precedent of utilities developing EV teams in 2011. Austin Energy constructed a roadmap of what it wanted to accomplish through a facilitation technique called the “brown paper exercise,” and then established roles based on necessity and fit. Professionals with EV experience were rare at the time, so Austin Energy had to be creative in hiring. Austin Energy sought candidates who were passionate about the field, took risks in their careers, or those who had expertise in the demographics they would be serving, such as a former apartment manager for Austin Energy’s multi-family program or someone with a career in the non-profit sector, such as Meals on Wheels, for its low-income program.

**Growth and Future Outlook**

Since it was formed in 2011, Austin Energy’s Electric Vehicles and Emerging Technologies team has more than doubled in size. The longevity of the team was initially met with skepticism by some at Austin Energy, but the conversation around EVs has now shifted from “if” the EV disruption will occur to “when” and “how quickly.”

In addition to a larger budget and scope, the Electric Vehicles and Emerging Technologies team has grown from five employees to 11 full-time staff. Austin Energy’s EV programs have been largely successful, including its Plug In Everywhere network, where one out of every three EV drivers is a monthly subscriber. The team plans to keep adapting and growing along with its programs, operations, customers, and revenue.

With a vision of the City of Austin’s smart mobility roadmap of shared, electric and autonomous technologies (which Austin Energy helped shape), the team plans to continue expanding its scope and driving the EV transformation through different initiatives, such as the roll-out of DCFC, actively supporting home charging, and various fleet electrification projects, as well as continuing to improve customer experience at the point of sale.
Utility Best Practices for EV Infrastructure Deployment

Austin Energy’s EV Strategy Portfolio (categorized based on a fact sheet titled “Principles for Utility Investment in Electric Vehicles,” published in 2018 by the Union of Concerned Scientists19)

1. Provide chargers where people live and work
2. Create a network of high-speed chargers along highways
3. Maximize benefits to ratepayers and the grid
4. Establish fair electricity rates for EV charging
5. Support electrification of trucks and buses
6. Support electrification of new mobility services
7. Ensure low-income communities benefit from electrification
8. Create an open and competitive market for EV charging
9. Engage stakeholders in an open and transparent process
10. Educate the public on benefits of electrification

Team Structure

Figure 6: Electric Vehicles & Emerging Technologies Team Organization and External EV Stakeholders at Austin Energy

Austin Energy EV & ET Team

Manager of Electric Vehicles & Emerging Technologies

Marketing & Outreach Position
EVSE Project Manager
Low-Middle Income Project Manager
Operations Team Manager
Utility Strategist
Emerging Technologies Project Lead
Fleet Electrification Project Lead
Consulting Engineer

Operations Team Member
Operations Team Member

“Friends of the Show”
Participants in EV/ET Activities Outside of the EV & ET Team

Austin Energy
Marketing
Data Analytics & Business Intelligence
Grants Administration Team
Policy & Regulatory Affairs
System Designer & Engineer

External
Austin Transportation Department
Austin Office of Sustainability
Austin City Fleets

Source: Developed by SEPA based on interview with Austin Energy, February 2020.

Primary Functions

- **Emerging Technologies**: Responsible for researching, partnering and deploying innovation pilots that include V2G, EV demand response, and energy storage integration. Applies for, negotiates and manages grant-supported projects.
- **Marketing & Outreach**: Responsible for developing and managing social and traditional media campaigns, as well as organizing, attending, and supporting major events and community outreach opportunities.
- **Operations**: Manages the reliability, billing, and customer service/experience of public and fleet charging, in addition to managing multiple rebates programs and the ongoing relationship with charging hosts.
- **Project Management**: Responsible for site selection and installation of EV charging infrastructure to include DCFC and fleet charging stations.
- **Special Projects (low- to moderate-income programs)**: Collaborates with the local government, service providers, and community stakeholders to deploy pilots and programs with a lens on equity and serving limited-income customers. Responsible for creation of specialized outreach and training to include “EVs for Schools” curriculum that launched in schools with high populations of students from low-income families.

Strategic and Financial Drivers

The pursuit of transportation electrification has also aligned well with Austin Energy's financial health strategic driver, as it has the potential to be the largest new source of revenue for utilities since the air-conditioning boom of the 1950's. Due to the differing load curve from air conditioning, EV programs and grid integration can effectively leverage existing capital infrastructure and ensure customers continue to receive affordable electricity. In Austin Energy’s case, most customers charge at home, which typically does not add to the existing load peak.

A utility’s diversion of resources to EVs is not only reactive to future loads, but it can also generate significant revenue today and in the near future. Austin Energy is receiving approximately $4 million in annual revenue from EVs (approximately $385 for every EV in its service territory), which already outweighs its spending of approximately $2.5 million on the program, and strong growth projections show revenues for Austin Energy that could net $270 million per year by 2033. Utilities can also mitigate program costs by taking advantage of external funding. Austin Energy’s Electric Vehicles and Emerging Technologies team has pursued and won 12 grants resulting in $10 million to support pilot programs around DER grid integration, equity, charging stations (Level 2 and DCFC), community college training programs, first responder training, and regional collaboration around electrification.

Austin Energy’s Success Factors

1. Marketing resources were effectively utilized.
2. EV-related grant opportunities were leveraged.
3. Austin Energy connected its EV public and fleet charging to green power, including the utility’s GreenChoice program, under which participating customers support 100% Texas wind.
4. “Cross-pollination” of ideas and resources between departments.

Takeaways/Lessons

1. Utilities should use pilots for incentives such as rebates (capped if needed to manage risk), and to develop relationships with early adopters.
2. Leveraging marketing/outreach is one of the most important functions of a utility’s EV team and should not be overlooked.
3. It is okay to fail, but fail quickly and move on. “True maturity of an emerging tech org is not only how quickly they can bring on a new project but how quickly they can kill an existing project,” Karl Popham believes, as this allows utilities to then divert resources to where they are more valuable.
4. Utilities must look at EV charging holistically, including home charging, where the vast majority of charging occurs, as a source of revenue.
5. Exploring different business models, such as creative rate design (e.g., monthly subscriptions), is one of many opportunities presented by EVs that utilities can leverage.
Case Study—Larger Team: Southern California Edison Transportation Electrification

Over the past few decades, Southern California Edison (SCE) has operated different versions of transportation electrification teams, as the utility helped to accelerate the EV market. According to Katie Sloan, Director of eMobility and Building Electrification, these groups were typically composed of five or six different departments working on transportation electrification and with varying degrees of centralization. Previously, transportation electrification efforts at SCE were developed in a highly decentralized fashion. That composition was adequate for SCE’s Charge Ready pilot and other smaller EV-related initiatives. The project management office for the Charge Ready pilot was housed in SCE’s customer programs and services department, coordinating with the sales team (in a different part of customer service), and the construction teams in the distribution organization, in addition to the regulatory, local public affairs, and corporate communications departments.

When SCE began thinking about designing a centralized eMobility® group, the timing was critical. As SCE sought regulatory approval for large-scale programs, including Charge Ready Transport (a medium- and heavy-duty transport program with a $356 million budget), and a passenger vehicle program expansion (Charge Ready 2 with a $760 million budget and which is built upon the Charge Ready pilot)\(^2\), the scale of investment required a new platform to gain traction and efficiently implement these programs within the utility. SCE undertook an effort to determine the best internal structure for a transportation electrification team. The process included interviews with the various stakeholders to understand the level of workload, the current capabilities and functions, and perceived future needs. Through those interviews, the team defined the challenges, the options, and an evaluation of how each option met the design criteria SCE wanted to optimize.

The Challenge

SCE sought to address four challenges:

1. **Strategy and Program Development:** There was no single point of accountability. The lead of the project management office in the customer programs and services team, in addition to other operational staff in sales and construction, worked on the Charge Ready pilot and approached the decision from an operational perspective. SCE also had a lead in its regulatory department looking at transportation electrification from a policy perspective. A member of SCE’s corporate strategy department also provided input. This led to confusion as to who was the decision maker as SCE was designing strategy and programs. It also occasionally led to insufficient focus from staff-level employees who did not know whether they were responsible to drive outcomes.

2. **External Engagement:** For external engagement, staff across SCE, including corporate communications, marketing, sales, local public affairs, regulatory, and legislative teams, spoke to the public about transportation electrification. According to SCE, while the high level of engagement and enthusiasm was beneficial, someone needed to help coordinate those activities. SCE needed to ensure it was prioritizing its resources in the areas needed to meet its strategic objective. SCE also needed to emphasize new commercial partnerships that did not exist previously.

3. **Operations:** SCE had a tight group of operations staff members working on the initial pilot. That approach worked for the pilot. The core groups included the project management office, the sales department, and the construction team. However, SCE knew it needed to create more structure around those interfaces and processes as it scaled programs from small pilots. SCE would be ramping from installing around 500 charging ports per year to 8,000 to 9,000 per year, depending on the size of the approved Charge Ready 2 program. Without a more centralized organization to manage technologies, processes and

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\(^2\) As of June 2020, state regulatory approval of this proposed program expansion was pending.
Communications, and to share lessons learned across a large team of employees, day-to-day operations would become quite complex.

**4. Technology:** Multiple groups in different organizations were engaged in pilots and technology testing without central oversight. These teams needed to develop a technology roadmap for prioritization to ensure resources were appropriately allocated.

**The Options**

Four options for building a team were identified, ranging from the decentralized status quo to a centralized option:

- **Patchwork Program Operator:** A decentralized approach, essentially maintaining the status quo.
- **Program Strategist, Lead Planner and Operator:** The option that SCE chose.
- **Program Strategist, Technology, Lead Planner and Operator:** Similar to the second option, but including technology.
- **Planner, Operator and Implementer:** The most centralized option that SCE explored, which would bring all functions into a single group.

**The Evaluation**

SCE created seven criteria for the evaluation, against which ten employees scored each of the four options. The criteria measured how each option would:

- Best meet SCE's customers' and internal clients' needs
- Meet aggressive goals
- Result in a single point of accountability
- Elevate the priority of transportation electrification among SCE's internal stakeholder organizations
- Create and manage the functions efficiently and effectively
- Optimize resource utilization
- Facilitate organizational agility

Although the scores were close, the option that scored highest was **Program Strategist, Lead Planner and Operator.** The key determinant was optimizing resource utilization and the economies of scale that could be achieved within their existing organizations, and leveraging the resources there. This new, centralized team represents the single point of accountability and provides three main functions:

1. **Strategy and Program Development:** Determines how SCE will meet corporate Transportation Electrification goals. For example, a corporate strategy team creates the “North Star,” targeting 26 million passenger EVs in California by 2045, and then the eMobility® Strategy Team decides the best path to achieve this goal. This process includes determining the programs and resources needed for SCE’s customers, and working with external stakeholders to achieve them. This team also coordinates with the regulatory team to gain regulatory approval for those strategies and new programs. Once approved, this team is responsible for preparing the program to launch at which point the responsibility moves to the operations team.

2. **Business Development and Partnerships:** The subject matter experts responsible for designing the tools and resources that the sales representatives need to encourage vehicle electrification and participation in SCE’s programs. They are also responsible for new partnerships with industry groups (e.g., fleet representatives and trucking industry associations) to accelerate EV adoption more broadly. They also coordinate other external engagement teams within SCE to set priorities and evaluate opportunities to engage the public.

3. **Operations:** Provides the program management function, including the day-to-day operations of shepherding customers from program application to construction. This includes processing rebates and invoices, and, when necessary, managing external parties that administer those programs (e.g., SCE’s Clean Fuel Reward program, which offers customers a $1,000 EV rebate). The team also has analytics and data responsibilities for reporting out on the programs and achieving the desired outcome.

The two primary functions that remain outside of the eMobility® Team are:

- **Account Managers:** The sales team in the business customer division is not solely focused on transportation electrification. It also focuses on energy efficiency, solar, and demand response options for customers. It was important for the sales team to keep a broader perspective. There are a few staff members on the eMobility® business development and partnership team who are specialists and create
tools and resources for the account managers to use as they engage in detailed conversations about fleet electrification.

- **Design and Construction Team**: The transportation electrification engineering design planners and field crews are housed in SCE’s large transmission and distribution group. SCE believes it would have been counterproductive to bring those functions outside of the existing organization with its long-standing processes, procedures and relationships.

While SCE's eMobility® team has operated for a short time relative to SCE's transportation electrification efforts, based on initial feedback, the reorganization has helped streamline the Charge Ready programs and created more certainty around accountability. The team is staffing up, growing from ten employees in early 2019 to 34 in April 2020, and handling the related organizational change management. The team has already defined the roles at a more granular level and communicated the new roles and responsibilities to other stakeholders in the company. The team is focused on executing on new programs, documenting processes more formally, and identifying operational efficiencies.

SCE believes the timing of this internal restructuring was critical. Waiting longer to do so would have required a significant amount of catch-up. At the same time, if SCE had restructured its transportation electrification team prior to the approval of the Charge Ready Transport program, there would not have been the sense of urgency and appreciation for what the team was doing, including the level of authorization and size of the budget.
4) Best Practices for Utility-Led Charging Infrastructure Programs

For utilities that intend to proactively support EV charging infrastructure deployment, several program options exist. Appropriate support mechanisms will depend on the market segment(s) addressed and the market barriers that exist, among other considerations. Some of these options may require regulatory approval in the case of investor-owned utilities.

- **Make-ready infrastructure**: The utility funds, owns, designs and installs all electrical and civil infrastructure on both sides of the meter for EV charging (including conduit, wiring, disconnects, switchgear, electrical panels, concrete pads, and the associated installation activities including trenching, boring, repaving), except for the chargers provided by the customer. Contribution payments may be required from program participants.

- **Infrastructure rebates**: The utility funds all or part of the make-ready infrastructure via a rebate, but the project is managed and owned by the customer.

- **EVSE rebates**: The utility provides a rebate for the chargers, but not for the make-ready infrastructure to support the chargers, and does not own any of the infrastructure.

- **Full utility ownership**: The utility funds, deploys, owns, operates and maintains the make-ready infrastructure and the chargers. Contribution payments may be required from program participants.

- **Utility EV fleet deployment**: The utility funds electrification efforts for its own fleet, including workplace charging for office employees and charging for utility-owned EVs. By doing so, the utility can gain valuable insight into common customer barriers, including financial issues and logistics planning.

According to SEPA’s 2020 Utility Transformation Challenge Survey (see Figure 8), responding utilities most commonly provide EVSE rebates, make-ready programs, and contribution in aid of construction for utility-led EV infrastructure programs. The majority of the survey respondents provide more than one type of program incentive. (The “other” category listed in Figure 8 includes grant programs, driver rebates, low-interest loans, funds to cover installation costs, and co-development of infrastructure with the private sector.)

For utility-led EV charging infrastructure programs, residential and/or commercial customers typically apply for utility-funded and developed infrastructure. Recruitment of a site host is sometimes necessary. The utility takes the lead and involves numerous internal and external stakeholders throughout the process. Some programs focus on spreading the maximum number of chargers across as many site hosts as possible, while others focus on fewer site hosts and larger numbers of chargers installed at each site. In both cases, utilities often plan and launch their programs with the intent of scaling in the future.

**Figure 8: Most Common Utility-Led EV Infrastructure Program Incentives**

Utility Best Practices for EV Infrastructure Deployment

To support and manage these EV charging programs, utilities can arrange their departments in different ways. This mostly depends on the size of the program and the level or terms of authorization from the utility's regulator, in the case of investor-owned utilities. Some utilities create a dedicated internal transportation electrification team that leverages their own departments to market and implement the program on its own (described in the previous section). Other utilities leverage both their internal teams and external contractors to assist with customer outreach, site walks, design, construction and implementation.

There are numerous steps in the process. Utilities should continually evaluate each step to ensure the program is streamlined for a positive customer experience. These steps include determining how each stakeholder group will be leveraged, the timeline, cost ranges, electric load studies, equipment characterization and approval, safety and reliability, grid system impacts, the customer engagement process, and developing the overall customer experience of the EV program.

How well a utility navigates the details of its EV charging infrastructure planning and deployment process directly impacts the customer experience. A positive customer experience means that:

- The customer easily understood the program requirements and enrolled.
- The customer effectively managed the steps needed to qualify for approval.
- The customer has flexibility within the program design to choose a qualifying solution that meets the customer's specific use and needs, while meeting the utility's specifications to manage the station on the customer's property.
- The charging installation was completed on budget and on time.
- The infrastructure was safe and reliable for EV drivers.
- The customer is not surprised by any higher-than-expected costs, such as demand charges.

The utility EV charging infrastructure program deployment process has five key steps:

1. **Planning**: site prioritization (if applicable), approval requirements, vendor qualification and request for proposal development, permitting agency outreach, quality control process development, employee training, customer experience development, and new systems development (e.g., IT development or project management office development).

2. **Customer Engagement**: customer marketing and outreach, and continual transparency into the sales team's efforts.

3. **Evaluation**: assessment and approval of the participating applications under specific parameters.

4. **Design and Construction**: efficient permitting and installation of all charging infrastructure on the customer side of the meter, and/or distribution upgrades on the utility side of the meter.

5. **Customer Follow-Up**: ensuring a positive customer experience through the end of the program by requesting customer feedback.

Additional factors for each step can include:

- The total number of charge ports required for installation
- The type and certifications of charging equipment
- The total number of site locations required for installation
- Job complexity and relative impact on budget
- The deadline to complete the program
- Targeted customer segments (e.g., single-family homes, multi-family dwellings, workplaces, public charging, medium- and heavy-duty fleets)

Engaging the Utility Customer

Utility EV charging infrastructure programs can involve a high number of customer touchpoints, as well as significant time to inform the customer about the program until the installation is completed. Both the sales and technical processes impact the customer experience and overall program satisfaction.

Reducing the volume of customer forms, approvals, meetings, site walks, calls, and construction disruptions, while helping customers smoothly move through the charging installation process will help ensure customers are satisfied with the program results. Providing open communication and a single point of contact for customers is also helpful. In addition, incorporating flexibility and providing customer options to the extent possible—whether during the construction process or allowing the site host to select and optimize charging hardware and network features—will increase program participation and satisfaction.
- Customer incentives if available, such as rebates for charging equipment or reduced installation costs
- Deployments dedicated to underserved communities
- Maintenance and safe operation of the equipment following installation
- The number of EVs enabled by installed charge ports
- Vehicle miles traveled converted to electric because of installed charge ports

For most multi-family, workplace, public and fleet sites in utility make-ready charging infrastructure programs, the utility will install the conduit to the EVSE on the customer side of the meter for AC and/or DC charging, which is one of the highest-cost components of an EV charging deployment. These programs often require customers to choose from a list of pre-approved charging vendors and EVSE in order to ensure that all basic safety and functional requirements are met, that the utility receives necessary charging data and/or load control capabilities, and that the use of open protocols is required or encouraged.

**Best Practices**

Acknowledging the differences between utility-led and customer-side EV charging infrastructure approaches, this section focuses on the aspects related to utility-led projects. These best practices, identified by the report authors and through information collected from leading utilities, EVSE infrastructure providers, and other experts in the field, address the five key steps (identified above) in the utility-led EV charging infrastructure program deployment process.

**Planning**

The most successful utility-led EV charging programs invest a substantial amount of time in the program planning phase to ensure a positive customer experience, ensuring that every customer touch point is streamlined and the customer’s input is solicited and incorporated.

<table>
<thead>
<tr>
<th>Table 3: Utility-Led EV Charging Infrastructure Planning Steps</th>
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</thead>
<tbody>
<tr>
<td><strong>Planning Step</strong></td>
</tr>
<tr>
<td>Identify Program Goals</td>
</tr>
<tr>
<td>Develop Site Prioritization Evaluation Criteria</td>
</tr>
<tr>
<td>Identify and Evaluate a Large Number of Potential Sites</td>
</tr>
<tr>
<td>Determine Customer Requirements for Site Selection</td>
</tr>
<tr>
<td>Procurement Considerations</td>
</tr>
<tr>
<td>Interface with AHJs</td>
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</tbody>
</table>
## Utility Best Practices for EV Infrastructure Deployment

### Table 3: Utility-Led EV Charging Infrastructure Planning Steps, continued

<table>
<thead>
<tr>
<th>Planning Step</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standardize Project Design</strong></td>
<td>Establish quality control processes for designs (if more than one design vendor is involved) to ensure a smooth permitting process.</td>
</tr>
</tbody>
</table>
| **Design Specific Employee Training Programs** | Develop an employee training program to inform what is often the largest group of potential community advocates. Create messages and training levels based on employee segments. These segments could include:  
  ▪ **Sales employees**—develop an in-depth training for employees acting as your customer-facing sales force. This could include commercial account representatives, customer contact center, program managers, and all vendors representing the program to customers or attending site walks.  
  ▪ **EV project management team**—training to help the team standardize and streamline customer processes, and efficiently move customers through each program phase.  
  ▪ **Operations team**—how to respond to an outage, maintenance, or other service request.                                                                 |
| **Incorporate EV Training Broadly** | Incorporate EV knowledge into all employee training efforts. The sales team and planners alike must have some understanding of the power requirements and EVs available for various classes. They include consumer light-duty vehicles, commercial light-duty vehicle fleets, ride-sharing light-duty vehicles, electric public transit buses, commercial medium- and heavy-duty vehicles, and various other mobile machinery, such as forklifts. Other departments such as customer service, public affairs, commercial account executives, construction and community relations will also play a pivotal role in improving the customer experience and therefore should be trained. |
| **Develop a Journey Map** | Develop a journey map for the ideal EV program customer experience, to streamline customer touchpoints and standardize the process. Touchpoints could include:  
  ▪ Customer learns about the EV program via utility website or proactive marketing outreach (email, social media, other channels)  
  ▪ Customer is contacted via email and call appointment scheduled  
  ▪ Customer call held to provide EV charging program information  
  ▪ Customer submits online application  
  ▪ Utility evaluates customer site prior to site walk  
  ▪ Customer site walk  
  ▪ Customer and utility design the site plan  
  ▪ Customer approves site plan  
  ▪ Customer signs off on final designs  
  ▪ Construction begins  
  ▪ Utility provides customer information to communicate to workplace employees or multi-family residents about charger usage  
  ▪ Utility confirms installation and energizes the chargers                                                                 |
<p>| <strong>Develop a Load Management Strategy</strong> | Include long-term load management strategies, including EV managed charging and vehicle-to-grid plans in the development of the program and in all of the infrastructure deployed. Favor open standards and protocols, such as OpenADR 2.0b, ISO/IEC 15118 and Open Charge Point Protocol (OCP). Also consider if or how to prepare the site for future integration of other technologies, such as stationary battery storage, on-site generation, and future increases in charger capacity and charging speed. |</p>
<table>
<thead>
<tr>
<th>Planning Step</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Use Interoperable Equipment</strong></td>
<td>Interoperability between vehicles, charging hardware, and charging software is an important goal that will ultimately accelerate EV adoption for all industry stakeholders. Deploy interoperable equipment where possible, using industry standards such as SAE J1772, ISO/IEC 15118, OCPP, OpenADR, and emerging standards in the medium- and heavy-duty EV segments as they become available.</td>
</tr>
<tr>
<td><strong>Develop a Desktop Review Process</strong></td>
<td>Provide commercial customers with non-technical charging installation designs they can easily understand, to speed up the internal review process and reduce the time to get a commitment.</td>
</tr>
<tr>
<td><strong>Implement Internal Processing Tools</strong></td>
<td>Implement a trusted customer management system for the transportation electrification team to allow multiple utility departments to quickly determine the progress of each customer installation, and where the customer stands in the process. Provide transparency to allow customers to check on their project's status. Ensure that the tool has the flexibility to manage process changes, as business and regulatory needs evolve. Integrate data between those tools and existing utility systems, such as customer information and distribution planning, so that multiple utility groups are involved in the process.</td>
</tr>
<tr>
<td><strong>Determine Participating Site Host Level of Engagement</strong></td>
<td>Determine how best to support and enable the participating site host to be a program partner. What program choices will be provided? May the host choose the equipment independently of the network service, as well as set access controls? What control will the host have over driver pricing and load management?</td>
</tr>
<tr>
<td><strong>Determine Customer of Record</strong></td>
<td>Determine whether the local site host will be the customer of record of energy provided to the station (i.e., the customer covers the energy costs via a traditional utility tariff) or if the utility will cover such costs. The former option links to the above consideration in allowing site hosts to set flexible driver pricing and avoids regulating EV driver pricing. Regulated EV charging pricing to drivers will involve consideration of how this may impact station utilization, driver experience, and impact on other utility commercial customers that may wish to install their own charging solutions.</td>
</tr>
<tr>
<td><strong>Rethink Procurement Strategies</strong></td>
<td>Encourage a larger pool of vendors to respond to RFPs, to encourage competition and create downward pressure on pricing (e.g., unit price contracts, and eliminating time and material costs where appropriate). Purchase hardware and EV charging solutions in bulk.</td>
</tr>
<tr>
<td><strong>Pre-Approve Charging Equipment</strong></td>
<td>Compile and publish a list of all charging equipment that the utility has tested and verified will meet necessary safety and functional requirements, to assist customers and expedite utility approval.</td>
</tr>
<tr>
<td><strong>Develop a Site Maintenance Plan and Designate an Operations Team</strong></td>
<td>Establish requirements or processes for maintaining the charging infrastructure over time and ensuring a positive customer experience. Take into account snow plowing, garbage removal, site host engagement, and customer service response. Plan to adjust in the future along with changes in EV adoption, driving patterns, vehicle charging rates, software improvements, etc. Train the designated operations team on maintenance, safety, and service requests necessary for the infrastructure.</td>
</tr>
</tbody>
</table>

Customer Engagement

Customer engagement is one of the most important considerations to ensure a successful program rollout. Customer engagement strategies can help maximize a utility’s program budget for marketing and minimize delays.

**Table 4: Utility-Led EV Charging Infrastructure Customer Engagement Steps**

<table>
<thead>
<tr>
<th>Customer Engagement Step</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop a Marketing and Customer Engagement Strategy</td>
<td>Develop and launch a marketing and customer engagement strategy targeting customer segments developed in the planning process. This will help improve customer response rates and reduce marketing costs.</td>
</tr>
<tr>
<td>Provide Transparency to Sales Team</td>
<td>Provide transparency to the sales team so it can quickly assess which stage of the program a particular customer has reached, and so it can proactively move the customer to the next stage with minimal impact to the transportation electrification team.</td>
</tr>
<tr>
<td>Plan Ahead for Program Change Announcements</td>
<td>Understand that with any new program process, adjustments will be needed along the way. Provide a way to efficiently update internal and external program representatives on program changes so they will speak to customers with one voice. In addition, develop a simple process to update the customer with any new information that may impact the timing of the installation.</td>
</tr>
<tr>
<td>Coordinate with Automakers and Local Dealers</td>
<td>Reach out to manufacturers and local dealerships to ensure they are aware of the EV charging program, and that dealers have EVs in stock to sell or lease. Not all EVs are available in every state and, in some cases, dealerships must be certified by the manufacturer to sell its EV models.</td>
</tr>
<tr>
<td>Develop a Dealership EV Training Program</td>
<td>Launch an EV training program for local dealers to ensure drivers seeking to purchase or lease an EV are met with knowledgeable sales staff. Sales staff are often the first driver touchpoint, and such training will provide a positive customer EV experience.</td>
</tr>
<tr>
<td>Coordinate with City Leadership and Fleets</td>
<td>Partner with cities to ensure adequate charging infrastructure is available to support municipal and customer-side fleet EVs. Help city staff and decision-makers prepare procurement documents and incorporate EV infrastructure planning into city planning materials. Assist city staff and decision-makers as needed with potential changes to permitting, zoning, right of way/easements, and building codes to streamline EV charging infrastructure deployment.</td>
</tr>
<tr>
<td>Provide Community Outreach</td>
<td>Work closely with communities to help them understand EV technology and provide opportunities to become familiar with EVs, such as ride-and-drive events. Work with corporate accounts to help them access workplace charging infrastructure and MUDs to provide charging access points for residents.</td>
</tr>
<tr>
<td>Leverage Third Parties</td>
<td>Programs should consider leveraging third parties to generate leads. These include both community-based organizations and private companies, which may also hold community connections, and already may be marketing and selling EV charging solutions in the utility’s territory. The more qualified vendors participating in the program, the greater the support. Your local Clean Cities coalition might be able to connect you with other parties.21</td>
</tr>
<tr>
<td>Support and Be Aware of Public Incentive Programs</td>
<td>Incentives offered by state or local governments for EVs and/or charging infrastructure have succeeded in driving EV adoption in many locations.22 Utilities should be aware of any current EV-related incentives and policies in their service territories.23</td>
</tr>
</tbody>
</table>


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21 See [https://cleancities.energy.gov/coalitions/contacts](https://cleancities.energy.gov/coalitions/contacts) for local representatives.


23 Note: These incentives can be searched through the U.S. Department of Energy’s Alternative Fuels Data Center at [https://afdc.energy.gov/laws](https://afdc.energy.gov/laws).
Utilities can invest ample time in evaluating sites to assess overall feasibility and to finalize a detailed implementation plan. The better the evaluation that can be performed at a site prior to the site walk, the less time site walks will require, saving the field team and the customer valuable time.

### Table 5: Utility-Led EV Charging Infrastructure Evaluation Steps

<table>
<thead>
<tr>
<th>Evaluation Step</th>
<th>Best Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Create Site Feasibility Review Processes</strong></td>
<td>Perform high-level reviews of each site prior to engaging a design firm for a formal site assessment to save on engineering fees for customer sites that cannot proceed through the program approval process due to site conditions. Standardized checklists and gathering basic data about each site at the beginning of the process are crucial to streamline the process.</td>
</tr>
<tr>
<td><strong>Package/Standardize Site Designs</strong></td>
<td>Develop threshold site sizes that trigger major equipment size changes. The switchgear and metering panels can be significant cost drivers for a site, and packaging in various sizes should allow a utility to leverage buying power for multiple panels at once, rather than site-specific special orders.</td>
</tr>
<tr>
<td><strong>Infrastructure Evaluation</strong></td>
<td>Recommend standard infrastructure design concepts for charging infrastructure to customers based on key data points (e.g., number and type of vehicles, dwell time and location, duty cycle for each vehicle type, use case/business model). For example, there could be a standard layout for a group of outdoor, pedestal-mounted Level 2 workplace chargers, and there could be a different layout for DCFCs at a shopping mall or bus depot.</td>
</tr>
<tr>
<td><strong>Understand Future Customer Plans</strong></td>
<td>Utilities are obligated to invest prudently and maintain reasonable rates for customers, but when it comes to EV charging infrastructure, it is also important not to constrain future EV adoption. More customers may purchase EVs; charging power levels may need to increase for various reasons; or more chargers may be added over time at the same site. When planning utility upgrades to support EV charging, utilities should solicit customer input on EV growth plans and incorporate useful input into the planning of specific upgrades (i.e., future-proofing, based on customer plans with a high probability of occurring). Of course, ratepayer-funded upgrades cannot be based on uncertain forecasts; they should be based on concrete customer plans.</td>
</tr>
</tbody>
</table>

Utility Best Practices for EV Infrastructure Deployment

Design and Construction

Design and construction are often the longest phases in the charging infrastructure project timeline. Utilities have an opportunity to significantly reduce overall project lead times by making these processes more efficient and consistent. Table 6 outlines best practices for utility-led projects. (Many best practices in the design and construction process are similar for utility-led and third-party EV infrastructure projects; for additional ideas, refer to the third-party infrastructure section.)

Table 6: Utility-Led EV Charging Infrastructure Design and Construction Steps

<table>
<thead>
<tr>
<th>Design and Construction Step</th>
<th>Best Practice</th>
</tr>
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<tbody>
<tr>
<td>Customer-Side Distribution Equipment Construction</td>
<td>Consider a service drop from a customer transformer when sufficient capacity exists and it is more economical than creating a stand-alone line extension, as some EV charging programs have required.24</td>
</tr>
<tr>
<td>Follow Americans with Disabilities Act (ADA) Guidelines for Public Charging Stations</td>
<td>Most public charging stations must include access for persons with disabilities and comply with the federal ADA guidelines.25 Federal statutes and national standards that guide accessibility requirements include:   - 2003 International Building Code   - 2009 ANSI A117.1   - Americans with Disabilities Act—28 CFR Part 36 In general, guidelines for providing access at EV charging stations for persons with disabilities include:   - Adequate space to move a wheelchair or other equipment in and out of the vehicle   - Placing operable parts of the charging equipment within unobstructed reach from a wheelchair   - Space for turning around a wheelchair near the charging equipment on the vehicle   - Charging stations on accessible paths and near the destination for which the parking was developed</td>
</tr>
<tr>
<td>Streamline the Permitting Plan Check Process and Reduce Fees with an AHJ</td>
<td>Coordinate working sessions with AHJs to reduce the time and cost associated with permitting and plan checks. Familiarize AHJs with EV charging infrastructure details and requirements. Leverage local or state mandates to influence AHJ performance and fees.</td>
</tr>
<tr>
<td>Construction Complete and Site Commissioning</td>
<td>Remain closely engaged with the final site commissioning of any EV charging infrastructure projects that involve high-power charging equipment and/or energy management technologies (e.g., on-site generation and battery storage), to ensure that such technologies are installed safely and in a way that can benefit the grid.</td>
</tr>
<tr>
<td>Future-Proofing</td>
<td>Where there is a reasonable expectation of significant EV demand growth in the coming years, make provisions in the design and construction of the charging infrastructure to allow future deployment of additional chargers and/or higher-power chargers.</td>
</tr>
</tbody>
</table>


24 There will be occasions when utility service upgrades are unavoidable for large EV charging infrastructure projects, and a separate utility service/meter is often required to take advantage of EV-specific utility tariffs.

Customer and Regulatory Follow-Up

Customer feedback is essential to continually improve a utility's program. Feedback can be collected through surveys, focus groups, or internal review to speed up processes, reduce costs, and improve customer experiences. To the extent possible, make the results of the program publicly available to help other utilities as they develop and improve their own programs. According to SEPA's 2018-2019 industry survey, most utilities (60%) do not have a customer feedback process. Those that do have a process (40%) typically utilize service satisfaction follow-ups, direct email outreach, a close-out meeting, and other forms of surveys to obtain the customer feedback. In addition to process feedback, survey respondents also indicated that aggregated charging data is critically important information to share with the industry.

<table>
<thead>
<tr>
<th>Follow-Up Step</th>
<th>Best Practice</th>
</tr>
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<tbody>
<tr>
<td><strong>Determine Customer Satisfaction</strong></td>
<td>Survey customers and other non-utility project stakeholders to determine satisfaction with customer experience, and improve process steps where needed.</td>
</tr>
<tr>
<td><strong>File Regulatory Reports</strong></td>
<td>Ensure all required regulatory EV program reports are filed.</td>
</tr>
<tr>
<td><strong>Facilitate Program Advisory Meetings with Stakeholders</strong></td>
<td>Facilitate periodic reviews with key stakeholders (e.g. charging solution providers, installers, etc.) to review results, solicit feedback, and review potential changes.</td>
</tr>
<tr>
<td><strong>Publish Findings</strong></td>
<td>Publish results of pilots and demonstration projects so others can benefit from the findings.</td>
</tr>
<tr>
<td><strong>Publish Aggregated Customer Charging Data</strong></td>
<td>To help the EV industry and decision-makers, publish, when possible, results of EV infrastructure interconnections and customer charging information to help inform planning activities. Ensure data is free of any personal information that customers may not want to disclose.</td>
</tr>
<tr>
<td><strong>Improve Process for Next Program</strong></td>
<td>Continuously improve the journey map and address identified pain points. Use learnings to better design and enhance the next EV program. Consider potential synergies between utility and government incentive programs, new rate designs, grant opportunities, and emerging hardware/software technology options.</td>
</tr>
</tbody>
</table>

Utility Best Practices for EV Infrastructure Deployment

Case Study: Puget Sound Energy Utility-led EV Charging Infrastructure Program

“It’s becoming, if it hasn’t already, an expectation that the utility is involved in charging infrastructure by OEMs, EVSE companies, and by consumers,” says Danielle Kievit, Clean Energy Product Manager at Puget Sound Energy (PSE). “So it’s definitely better to be proactive in understanding market needs while also taking a collaborative approach to planning for the future with customers and partners.”

PSE, an investor-owned utility in Washington, began to develop a set of EV programs after regulatory and statewide coordination determined that utilities are a critical part of EV market transformation. There is also a need to deploy smart EV infrastructure throughout the state, while also managing the associated loads from projected EV adoption.

Up & Go Electric is a comprehensive transportation electrification portfolio, under which PSE owns and operates charging infrastructure. This includes a suite of offerings aimed at addressing customer pain points around vehicle charging while broadly supporting the EV market throughout the U.S. Pacific Northwest. The program portfolio includes the following elements:

- **Education & Outreach:** provides EV information to customers through Ride & Drives, online calculators, technical assistance, newsletters, and social media marketing.
- **Residential & Off-Peak Charging:** includes installation of 500 Level 2 smart chargers in customer homes with the goal of understanding customer charging behavior and associated propensity to shift to off-peak hours.
- **Multi-Family Charging:** includes installation of Level 2 chargers at 25 multi-family locations with up to three ports per location. Charging patterns are studied from these customers.
- **Workplace & Fleet Charging:** Up & Go expands on workplace and fleet charging availability by installing Level 2 chargers at 50 workplaces and fleet operators to better understand best practices and load impacts for workplace and fleet charging.
- **Public Charging:** PSE will install DCFC and Level 2 charging “hubs” at eight locations. PSE developed an innovative charger siting model for the public charging program, which includes customer input, walk scores, vehicle forecasts, and PSE system planning information.
- **Low-Income:** PSE worked closely with communities and service providers to develop five low-income pilot programs. This includes vehicle conversion, electric buses, non-emergency medical transportation, and community vans.

PSE's Up & Go Electric program was designed to support statewide market transformation goals of 50,000 EVs on the roadway by 2020 (accomplished in 2019), and PSE is beginning to understand and prepare for charging load management. The charging programs gather insights into EV drivers’ charging behavior to learn how to efficiently scale smart charging. The load data gathered from smart charging stations will measure consumers’ charging behavior across the different use cases.

One of PSE’s primary takeaways from its experience with EV infrastructure programs is the importance of education. According to Kievit and technical advisory groups, most customers do not have direct experience with EVs, which can present unknowns for many customers, fleet managers, and property owners. Therefore, utilities should convey the benefits of transportation electrification and how such investments may actually yield a lower total cost of ownership for an EV customer. Furthermore, Kievit stressed the value of making a utility EV subject matter expert available to customers. “When customers are considering installing EV charging infrastructure, their first stop is often the utility,” Kievit noted. “So it is essential that the utility can address questions and play an active role in customers’ electrification goals.”

Up & Go Electric: Residential & Off-Peak Smart Charging Program

To develop PSE’s current Up & Go Electric program, PSE leveraged lessons from its first residential EV charger rebate program, available from 2014 to 2017, which issued rebates to around 2,000 EV drivers. In 2019, PSE launched the Up & Go residential program with a goal of understanding the full customer journey—from initial customer interest to determining charging needs, EVSE installation, consumer charging behavior, and the
customer propensity to shift residential charging to off-peak hours—in order to understand load management strategies and how to address customer pain points. According to Lauren Burke, Senior Director of Marketing and Development with Enel X (a PSE partner), “PSE's unique end-to-end program was thoughtfully developed and implemented to best meet the needs of their customers and achieve the utility's goals.”

In partnership with Enel X, PSE launched the Up & Go Electric residential charger program. Five-hundred qualified customers received a PSE-branded JuiceBox® smart charging station, powered by JuiceNet® software, through an easy online process. The Level 2 chargers provide the customers with a cost-effective, network-connected solution, while also enabling PSE to support EV adoption and understand the most effective method for managing peak electricity demand. Through the JuiceNet® platform, PSE monitors drivers' charging patterns, and sends email messaging and price signals to the customers to incentivize non-peak charging. Ultimately, this will help determine methods to encourage customers to charge when renewable energy is most available.

Marketing Success
The program, which attracted strong interest from customers, reached full capacity shortly after its launch in part due to a highly targeted email marketing campaign using geo-targeted segments. This allowed PSE to align installation resources while marketing specifically to eligible residential customers across its service area. Prior to the program's launch, PSE captured EV owner survey results through a newsletter distributed to customers. As a result, the email target list included 764 confirmed “known EV drivers,” with the highest concentration of EV drivers, approximately 500, in King County (greater Seattle area).

Installation Know-How
PSE managed demand and customer expectations around its installation timeline with proactive customer communications and optimized installations. The program was also designed with an Enel X installer training component to ensure every JuiceBox® smart charger was properly installed and connected to WiFi for smart charging events. According to Enel X, other utility programs that offer “Bring Your Own Device” residential rebate programs, under which the resident is responsible for installation, do not experience 100% EV charger connectivity. This ultimately reduces the number of distributed EVSE assets for demand response programs. By managing the end-to-end process, PSE ensured connectivity while also clustering EVSE residential installations efficiently, resulting in about 70 JuiceBox® charger installations per month.
5) Best Practices for Third-Party Charging Infrastructure Interconnection

Even if a utility does not want to or cannot make investments in a utility-led charging infrastructure program, it should create a separate (and complimentary) process for supporting the interconnection of third-party charging infrastructure. In such cases, additional best practices apply. Notably, many of the recommendations included in Section 4 could also apply to the development of a charging infrastructure interconnection program and should also be considered.

When site hosts, charging companies, commercial accounts, or other non-utility organizations initiate an EV charging infrastructure project, they typically follow a process consisting of four major phases, including:

1. **Planning:** The lead organization typically begins by understanding the EV population (whether consumer EVs or commercial fleets); identifying and acquiring one or more sites (based on criteria for selection); selecting vendors for hardware, software engineering, and construction; sizing the project and determining the business case for the charging infrastructure (including an analysis of utility rates); and securing funding. These steps can be initiated by simple workplace tenant requests or through more complex means such as EV fleet owner economic optimization.

2. **Design, Permitting and Incentive Application:** For each location, a detailed site assessment is conducted to specify exactly where and how to install the EV charging infrastructure. Equipment is selected, detailed design drawings are prepared, and the designs are reviewed and approved by the appropriate AHJ (e.g., the local building department).
   - If a utility service upgrade or new utility service is required—which is becoming more common with increasing charging power levels—the lead organization must submit an application and gain utility approval to proceed. The utility will then design and plan the new infrastructure on the utility side of the meter (and possibly on the customer side of the meter if a utility “make-ready” program is in place).
   - At this stage, the AHJ and/or the utility will ensure that the charging equipment specified in the design meets all basic safety and functional requirements.
   - Also, if an incentive or rebate is offered for installing EV charging equipment, the lead organization will submit the application to the utility.

3. **Construction, Installation and Commissioning:** After securing the necessary permits and utility approvals, the construction contractor completes any civil preparations needed (e.g., trenching or foundations for equipment), and then the EVSE and supporting electrical equipment are installed and connected to the main utility service at the site or subpanel.
   - A final inspection by the AHJ is usually required before the EV charging infrastructure can be placed into service, to ensure the charging infrastructure is installed according to code. The EVSEs must be commissioned to ensure they are functioning properly. (If networked, the connection to the software back-end for ongoing monitoring, if intelligent, must be completed as well.)
   - If new or upgraded utility service is required, the utility must complete construction of its new infrastructure before the customer-side infrastructure can be energized. Should an incentive or rebate be granted to the lead organization for installation of the EVSE, a utility inspection will often occur to validate the application.

4. **Commercial Operation:** After commissioning, the EV charging infrastructure commences commercial operation and then undergoes regular preventative maintenance, as well as unplanned corrective maintenance throughout its lifetime. Typically, the chargers are remotely monitored and controlled through a software back-end and user interface. In many cases, over-the-air firmware updates can continuously improve charger functionality. Throughout the life of the infrastructure at each site, the EVSE may be upgraded and/or replaced as new technology becomes available or as the original equipment wears out. If using open protocols, the equipment owner can even migrate the EVSE to a new software platform from a different vendor.
Information and Studies Required

When planning significant levels of EV charging infrastructure at a single location, some utilities require the following information from customers or project developers:

- A customer project information sheet, including contact information (for the host customer and contractor); a legal contact for contracting; the scope of project (e.g., equipment type Level 2 and/or DCFC, make/model of equipment); the panel size; and the service voltage and phase
- A design option letter, authorizing the design of the charging infrastructure and any required service extension
- A PDF file of and/or CAD site plans
- A load calculation
- An electrical panel single line diagram
- Customer preferences for combined or separate metering of EV charging
- Other information sometimes requested by utilities in rebate programs, including project type, charging network, project costs, and a copy of the business license (if applicable)

As part of the process, utilities may conduct the following types of studies:

- Assessment of existing loads
- Impacts of new charging loads

According to SEPA's 2018-2019 industry survey (see Figure 10), data and documents commonly required by utilities to perform service requests for EV charging infrastructure include an assessment of existing electrical load at the site, a site plan, a load calculation, a single line diagram, and a customer project information sheet.

Best Practices

As in Section 4, best practices for customer-side EV charging infrastructure deployment were identified by the report authors, as well as through information collected from leading utilities, EVSE infrastructure providers, and other experts in the field. This section is divided into three steps—internal planning, customer engagement, and design and construction—that utilities should consider addressing and incorporating into their processes.
Internal Planning

A utility should assess the current planning process and identify gaps associated with interconnection of third-party EVSE. This analysis will help the utility decide how best to respond to customer demand, while determining what steps in the planning process need updating. Internal planning will help lay the foundation for a successful customer-side charging infrastructure program.

<table>
<thead>
<tr>
<th>Internal Planning Step</th>
<th>Best Practice</th>
</tr>
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<tbody>
<tr>
<td>Utility Planning Integration and Market Research</td>
<td>Develop EV forecasts to gauge what amount of charging infrastructure will be deployed in the utility’s service territory, and generate a planning process to meet anticipated customer needs. Work with customers and other relevant stakeholders to integrate charging infrastructure deployment plans into Integrated Resource Plans (IRPs) and Distribution Resource Plans (DRPs), to ensure future generation and distribution system capacity are adequate. Understand the needs of the customer through customer surveys and focus groups. (Additional details regarding this recommendation are featured in SEPA’s companion report published in October 2019, “Planning for an Electric Vehicle Future: How Utilities Can Succeed.”)</td>
</tr>
<tr>
<td>Priority Queue for EV Infrastructure Projects</td>
<td>For most utilities, charging infrastructure interconnection waits in the same queue as all other service requests. Since the transportation sector accounts for the largest share of U.S. greenhouse gas emissions, and EV charging can lower rates for all ratepayers by improving asset utilization, utilities should consider prioritizing EV infrastructure projects—particularly those that are larger in size. Furthermore, utilities should administer interconnection queues more effectively by using software that is available to other utility departments, similar to distributed solar interconnection requests, to increase transparency.</td>
</tr>
<tr>
<td>Outage and Emergency Planning</td>
<td>As more customers depend on deployed charging infrastructure, utilities should begin integration with outage management procedures by planning for outage relief and developing processes for emergency events that would necessitate evacuations. Define how the utility would restore power to chargers, identify complementary technologies to assist with onsite power generation, and publicly communicate charger status.</td>
</tr>
<tr>
<td>Identify Future Load Management Opportunities</td>
<td>Work with customers to identify opportunities to incorporate load management options in the infrastructure. Encourage customers to use managed-charging capable equipment to future-proof stations, which may include open standards such as Zigbee (Residential/Business behind meter), IEEE 2030.5, OpenADR 2.0b, ISO/IEC 15118, and Open Charge Point Protocol (OCPP). For medium- and heavy-duty fleet customers, plan to educate fleet managers and others about EV charging impacts on peak loads and potential mitigation techniques that work with the unique needs of their fleet.</td>
</tr>
<tr>
<td>Engage Industry Stakeholders</td>
<td>Seek input from automakers, charging hardware/software vendors, engineering/construction firms, maintenance firms, financiers, consumers, commercial fleets, local Clean Cities Coalition, and other stakeholder groups who can offer insights on how to improve utility processes. Solicit the “voice of the customer” by incorporating customer surveys or interviews into the journey mapping. This will help inform initial or iterations on program design and support user-centric approaches to EV program management.</td>
</tr>
</tbody>
</table>


27 The transportation sector accounted for 28% of all U.S. greenhouse gas emissions in 2018, according to the U.S. Environmental Protection Agency. See https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions.
Customer Engagement

After a utility has adopted an internal plan, it should proactively engage and market the process to its customers, by segment. SEPA's 2018-2019 industry survey and interviews consistently identified these suggestions, as well as additional transparency, as the most important opportunities for EV charging infrastructure projects to move forward.

Table 9: Third-Party EV Charging Infrastructure Customer Engagement Steps

<table>
<thead>
<tr>
<th>Customer Engagement Step</th>
<th>Best Practice</th>
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</table>
| **Publish an EV Website and Follow ADA Guidelines for Digital Content** | Provide maximum engagement on a dedicated utility EV website so that the utility can capture potential and current EV drivers at all stages of the EV procurement journey. The site should include:  
  - Guides (e.g., EV selection and the experience of owning and driving an EV)  
  - EV rates and rate options  
  - Tools that provide as much personalization to the individual consumer as possible, including an EV rate calculator that accurately reflects all available rate structures (i.e. demand charges, minimum bill charges, etc.)  
  - Tools that offer enrollment to alternate rate options based on individual consumer preference (i.e. lower cost, less seasonal variability, etc.)  
  - Guidance to determine the business case for end-users to switch to electric, including cost of capacity (or avoided) and marginal wholesale electricity prices  
  - Consideration for installing EVSE that links customer-sited economics (i.e. rate analysis) with potential incentives or rebates and gives the customer individual decision support for installing EVSE (e.g. what it means to install and operate EVSE on their premises)  
  - Web-based content, including resource guides, should be available to all users, including those with disabilities, as detailed for state and local government program websites in Title II of the ADA. Utilities should meet the same standard to ensure all customers have equal access to EV programs. The technical standard for accessibility is defined through the W3C process and documented under Web Content Accessibility Guidelines (WCAG).28 |
| **Publish Comprehensive Resource Guide** | Create a step-by-step guide through the utility process for interconnecting EV charging projects. The guide should include:  
  - Resources for easements (including flexibility for term-limited easements), permitting, and capacity upgrade requirements  
  - Information on underground secondary grids in dense urban areas  
  - National standards and other best practices information to help end customers  
  - Site guide specifications, including requirements for the secondary path  
  - Guidelines for application data requirements and the inspection process, with transparency into total customer fees |
| **Publish or Provide Access to Feedback on Network Access** | For charging networks and project developers, publish optimal and/or preferred charger locations to facilitate site selection for EV charging infrastructure. This could include heat maps with 208V and 480V three-phase service and distribution circuit capacity and transformer loading (including underground vault capacity in dense urban areas). For customers, provide feedback during the application process that helps them understand the available capacity (e.g., transformer, feeder) at their location and what has triggered or might trigger system upgrades.

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28 W3C, 2018, Web Content Accessibility Guidelines 2.1, [https://www.w3.org/TR/WCAG21/](https://www.w3.org/TR/WCAG21/).
### Table 9: Third-Party EV Charging Infrastructure Customer Engagement Steps, continued

<table>
<thead>
<tr>
<th>Customer Engagement Step</th>
<th>Best Practice</th>
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<tbody>
<tr>
<td><strong>Identify Dedicated Account Managers for Infrastructure Vendors</strong></td>
<td>Increase access to dedicated utility EV staff to serve as the main point of contact for charging networks and project developers building infrastructure. Since vendors will likely have repeated business with utilities, working with the same utility representatives helps build rapport.</td>
</tr>
<tr>
<td><strong>Minimize Interconnection Pain Points</strong></td>
<td>Streamline interconnection process for charging stations in order to manage fees for customers. Increase transparency to help customers better understand where they stand in the review and approval process, including utility service upgrade requirements, timelines and costs. Automate much of the processing through managing agreements with eSignature and processing payments with ePayment solutions. Centralized document management will facilitate review and comments on application attachments such as site plans and facilitate coordinated feedback to the charging station developer. Lastly, an integration with the map tools will help both the utility’s engineering group more efficiently study impact and enable the customer to make more intelligent site selection decisions.</td>
</tr>
<tr>
<td><strong>Consultative Utility Design (preferred vendor network/energy marketplace)</strong></td>
<td>Serve as an advisor to customers regarding charging equipment options, EV types, and/or charging infrastructure locations. Residential and commercial customer needs can vary greatly with respect to the amount of consultation pre-interconnection. Commercial sub-segments (workplace, MUD, fleets) will also require different levels of interaction. For commercial customers, pre-interconnection, provide a consulting option to perform a site visit of the premises with the customer to help identify where the power enters the site and to offer recommendations to help save money, prevent delays, and negotiate the best charging location. Sometimes charging infrastructure providers are restricted by the site host with respect to which parking spaces they may use, so determining which service point to use at a location (if there are multiple) provides additional options.</td>
</tr>
<tr>
<td><strong>Harmonizing Processes Between Utilities and Subsidiaries</strong></td>
<td>Charging infrastructure developers often work in different areas of the United States and encounter difficulties while learning new processes for different utility service territories—even among utilities that share the same parent company. Harmonizing the interconnection processes between utilities would significantly aid the industry. In one example of progress in this area, the Edison Electric Institute (EEI), in collaboration with the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA), has issued an “Electric Service Evaluation Template for Electric Fleets.” The template is designed to assist electric customers pursuing fleet electrification who are prepared to begin evaluating their project’s electric service needs. Such customers are encouraged to fill out and submit the template to their utility, which will evaluate the electrical service needs for the customer’s project. (This template is included as an Appendix to this report.)</td>
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Design and Construction

Because design and construction are typically the longest phases of the project timeline, it is important for utilities to consider how to minimize cost and time, as well as simplify the process from the customer perspective.

Some utilities, such as SCE, have developed and published interconnection timelines to help customers understand their process and provide transparency (see Figure 11).

**Figure 11: Timeline and Process for Southern California Edison Commercial Customer EV Charging Infrastructure Projects**

![Timeline Diagram]

- **Customer Request for Pre-con**
- **Customer Construction Activity**
- **Customer/Contractor Request for Inspections:**
  1. Trench
  2. Mandrel
  3. Final
- **SCE Civil/UG Construction**
- **Electrical Construction Scheduling**
- **Electrical Construction Energized (Project Complete)**

**Customer Requirements:**
- Easement
- Invoice Payment
- Contract
- TOUEV Application for Service
- City Panel Release
- Address Verification and Placard

Note: Please allow 48 hours for processing new submittals for design and construction scheduling. Large jobs are determined by labor hours it takes an SCE crew to complete a project. Small jobs are less than 120 man hours; large jobs are greater than or equal to 120 man hours.

*Level of effort is the quantity of days needed to complete the SCE crew work.

Source: Southern California Edison, 2019.
## Utility Best Practices for EV Infrastructure Deployment

**Table 10: Third-party EV Charging Infrastructure Design and Construction Steps**

<table>
<thead>
<tr>
<th>Design &amp; Construction Step</th>
<th>Best Practice</th>
</tr>
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<tbody>
<tr>
<td><strong>Create Term-Appropriate Utility Easements</strong></td>
<td>Some charging infrastructure providers have limited duration contracts (e.g., 5-10 years) with site hosts; therefore, utility easements that go into perpetuity may create problems for the site host. Provide easement duration options that are tied to the EV charging station agreement a developer has with the landlord, and flexibility on easement language (e.g., “a good and sufficient quitclaim” at the request of the property owner).</td>
</tr>
<tr>
<td><strong>New or Upgraded service Request</strong></td>
<td>Establish a single point of contact that has visibility into the request’s location in the process, and all other requests from that customer. Utilize dedicated design experts that have experience with charging station projects.</td>
</tr>
<tr>
<td><strong>Pre-Field Verification and New Submittal Design</strong></td>
<td>Establish a clear and timely process to accurately assess the feasibility of supplying power to charging providers. Charging owner-operators may need to assess five or more potential sites for each site ultimately built. Identify extensive utility upgrades that may be necessary upfront and potential impacts to construction timeline if selected.</td>
</tr>
<tr>
<td><strong>Preliminary Construction Design</strong></td>
<td>Designate a single point of contact to help push projects through all processes to completion. Leverage land departments to avoid designing utility runs that require easement approval from third-party land holders. Third parties can be difficult to contact, unresponsive and unwilling to approve an easement, or may request an exorbitant amount of funds from the charging company that could erase any savings from using a shorter utility path.</td>
</tr>
<tr>
<td><strong>Final Design and Send Customer Contract and Invoice if Due</strong></td>
<td>Designate a single point of contact at the utility, even if the design is outsourced to third-party contractors, to help assist with any billing or design issues.</td>
</tr>
<tr>
<td><strong>Request for Inspections—Pre-Construction, Trench, Mandrel and Final</strong></td>
<td>Given the short construction timelines for charging stations, these processes ideally should operate in parallel rather than occurring sequentially with long wait periods at each step.</td>
</tr>
<tr>
<td><strong>Electrical Construction Energized and Project Complete</strong></td>
<td>Coordinate and plan utility construction and interconnection in advance. In many cases, DCFC owner-operators have completed their construction while waiting weeks for utility construction and energization. Testing and commissioning should be included, especially if utility load management is a possibility. UL certification (or equivalent) is generally required for any charging equipment. For utilities, California's state guidelines are a helpful starting point for a charging infrastructure safety compliance protocol. Ensure that a utility point of contact is available to help coordinate and communicate any unanticipated delays.</td>
</tr>
<tr>
<td><strong>Construction Completion, Commissioning, Meter Set, Billing Set-Up</strong></td>
<td>Coordinate with all necessary departments via the internal processing tools to ensure quick and timely turnaround of these final steps. Coordinate and plan utility construction and interconnection in advance. In many cases, DCFC owner-operators have completed their construction while waiting weeks for utility construction and energization. Provide transparency to the customer on the meter and account set-up process at the end of construction, and ensure customers are placed on the most appropriate rate, including any qualifying EV rates. Where applicable, ensure bills are sent to the charging company, and not the charging location, which may not receive mail.</td>
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29 The California Public Utilities Commission (CPUC) has issued a checklist of safety requirements for CPUC-approved transportation electrification programs. Utilities must ensure that specific pre-construction, construction, and operational standards are met. The checklist is available at [https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882](https://www.cpuc.ca.gov/WorkArea/DownloadAsset.aspx?id=6442458882).
6) Policy Considerations

Policy considerations should include low-income and underserved customers and ensure an equitable distribution of charging access for all customers and geographies, including rural areas. EV charging is an emerging land use where few AHJs have developed precedents. As a result, regulations and processes vary widely across jurisdictions, increasing permitting approvals and development times, complicating standardization, increasing litigation risks for EV charging site hosts, and increasing costs. Utilities have a strong role to play in their service territories to help smooth this process.

In addition, standardization and interoperability (e.g., charging port connectors, payment systems, and hardware and software communication) are critical considerations for utilities and stakeholders in the development of charging infrastructure, creating positive customer charging experiences with EV drivers, and supporting competition and innovation in the EV charging product and services market.

Low-Income and Underserved Customers, and EV Equity

Utilities can play a critical role in the acceleration of EV adoption across all market segments, particularly for low-income and underserved communities, and for different geographical areas, including rural areas. Policy recommendations led by utilities in partnership with stakeholders focused on EV equity can help enhance access to both EVs and charging. A transportation system that benefits all people will embrace an equitable deployment of investments and policy interventions to prioritize the mobility needs of low-income and underserved customers.30 These recommendations include:

- **Consider All Modes of Transportation Electrification:** Partner with community-based organizations and stakeholders to assist in working with communities to prioritize their needs for electric transportation in both urban and suburban areas. For urban areas, such modes of transportation could include walking, biking, high-capacity clean transit, electric bikeshare and carshare programs. For suburban areas, they could include “complete streets” for biking and walking, high-capacity electric transit to job centers, and electric carshare and bikeshare programs.31 Electrification can offer unique ways to increase the speed and range of biking and micromobility that fill the first/last-mile gap to mass transit. Also, consider providing programs that increase EV usage, but do not require recipients to own vehicles, such as rideshare programs.

- **A Positive Customer Experience:** Streamline the process for consumers looking for low-cost EVs, for accessing incentives, and for charging in public and at home. Creating supportive, turnkey offerings that can better address difficult-to-access or underserved market segments is also a powerful tool in creating a positive customer experience.

- **Rate Design and Load Management Programs to Incentivize Beneficial Charging Behavior and Deliver Greater Fuel Cost Savings:** Offer special EV rates (e.g., time-of-use rates) and smart charging programs that incentivize customers to reduce their EV fueling costs when engaging in grid-beneficial charging behavior. Managed charging can both minimize customer costs and lower average system costs.

- **Stakeholder and Community Engagement:** Work closely with stakeholders focused on low-income and underserved customers to understand their unique needs and to help design programs best suited for their communities. Utilities should be a reliable source of information for customers.

- **Multi-Family Focused Programs:** Offer supportive utility programs that support EV equity and underserved customers to address cost-prohibitive EV charging infrastructure installations in multi-family communities. In addition, many utilities and their customers have found EV charging retrofits to multi-family communities can be expensive. Policies that require modifications to building codes to install EV charging infrastructure for new multi-family communities can help address this issue.

31 Ibid.
**Utility Best Practices for EV Infrastructure Deployment**

- **Expanded EV Choice:** Provide greater choice of EV models and lower price ranges for consumers to allow more drivers to afford the vehicles. The ZEV MOU goals require automakers to sell EVs in participating states. This expands EV availability as well as consumer choice.

- **Point-of-Sale Incentives:** Reduce the cost of new and used EVs with incentives that are made available at the time of purchase to benefit low-income customers by preventing those customers from needing to front funds until they can apply for and receive a rebate in the future. Some policies recognize this issue and are shifting from a rebate model to a point-of-sale incentive model. In addition, screening for pre-approval and raising incentive levels for income-qualified customers can reduce the barrier to purchasing or leasing.

- **Air Quality:** Utilize fleets that can deliver air quality benefits to underserved communities. Electric transit buses will top this list.

**Permitting**

Regulation will always chase innovation. This is especially true with the current state of permitting for EV charging infrastructure. While permitting is a risk to most development projects, EV charging is an emerging land use where few AHJs have developed precedents. The nature of permitting at the local level means there is little, if any, coordination or standardization between jurisdictions or utilities serving those AHJs. As a result, regulations and processes vary widely across jurisdictions, increasing development times, complicating standardization, increasing litigation risks for EV charging site hosts, and increasing costs. However, utilities have opportunities, by working with regulators and developers, to contribute to a more streamlined process. There is cause for optimism as permitting processes have begun to improve in parts of the United States.

The process and requirements for obtaining EV charging building permits are similar to other types of development, with a patchwork of federal, state, regional and local rules to manage. While little data is available, developers and land-use consultants share anecdotes about the need to educate permitting agencies that are approving EV charging infrastructure for the first time. This can cause ambiguity and multiple design iterations for both the electrical and civil scopes of work. Electrical contractors may not be as knowledgeable about complex civil site considerations, such as parking requirements under the ADA, which can further complicate installations.

Challenges also surround communication between AHJs and utilities, as they are typically separate entities altogether. For example, in most jurisdictions, unless a panel upgrade is required for a residential customer, notifying the utility of an EVSE installation is not required. Consequently, the utility service equipment may not be sized properly to handle the charging behaviors and load profile of the EV(s). Even if there is a panel upgrade, the utility may not require information on the reason for upgrade and will likely miss the opportunity to plan for the different load profiles.

While permitting challenges remain, progress is advancing in some jurisdictions, especially in areas of the country with higher EV adoption and ZEV programs. Permitting rules in California are becoming more consistent with gradual adoption of AB-1236 (effective since 2015). This law limits the review of EV charging permit applications by AHJs, stating that “implementation of consistent statewide standards to achieve the timely and cost-effective installation of electric vehicle charging stations is not a municipal affair... but is instead a matter of statewide concern.” The implementation of AB-1236 has had challenges, but some cities are increasing transparency and developing checklists for developers.

Many examples, such as the City of Palo Alto’s checklist, walk contractors and homeowners through the process of installing an EVSE and even extending “over-the-counter” permit approvals in one or two day.32 Palo Alto’s permitting process is unique for its integration with utility information and network planning needs. Also in California, San Bernardino County has created a Zero-Emission Vehicle Readiness and Implementation Plan.33 Notably, San Bernardino County’s plan includes embedded toolkits tailored to each kind of commercial charging—destination, MUD, public institutions, and workplace. It also includes a table with the existing permitting codes and checklists per municipality.

While California was first to begin addressing EVSE permitting at the state level, other U.S. jurisdictions are implementing effective and transparent permitting and building codes as well. In Montgomery County, Maryland, EVSE developers and homeowners have access to an easy-to-understand permitting and inspection process.

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32 The City of Palo Alto’s process for installing a residential EV charger, which includes guidelines to assist permit applicants in streamlining the permitting, installation and inspection process, is available at [https://www.cityofpaloalto.org/gov/depts/utl/pathway_to_sustainability/electric_vehicle/homes/installing_an_ev_charger.asp](https://www.cityofpaloalto.org/gov/depts/utl/pathway_to_sustainability/electric_vehicle/homes/installing_an_ev_charger.asp).

Electric Vehicle (EV) charging permitting regulations and processes vary widely across jurisdictions, which can increase development, times, litigation risks, and costs. But, utilities, regulators, and developers can help streamline that process.

Online resources help set expectations for design and permitting the installation. Montgomery County also spells out its right-of-way EV charging plans in specific detail. One of the options for residential customers is to place charging receptacles in the public right-of-way. While this area is typically reserved for utilities and certain public equipment such as street lights, opening it up for private EV charging infrastructure expands the ability for residential customers with street-parking to install chargers. 

Momentum continues to build for consistent and transparent permitting processes, but many opportunities still exist for advocates of transportation electrification to engage in the process to reduce risks and costs to permitting. Utilities are in a unique position to embrace change and provide support and leadership in collaboration with their customers, regulators, and developers.

Information provided by Black & Veatch in Figure 12 summarizes several steps to help streamline EV charging permitting.

Utilities are particularly well-positioned with their understanding of hosting capacity, infrastructure requirements, and existing relationships with regulatory bodies. Most utilities should see the potential load growth from EVs as an important strategic growth area and opportunity while also improving overall system utilization, putting downward pressure on rates. Utilities should also consider that permitting challenges are compounded by unclear and complex hosting capacity, easements, grid improvements, and interconnection requirements. In addition, utilities should seek to educate AHJs on EV charging technology, safety, and benefits and advocate for consistent land use compliance, permitting processes and building codes at the regional and state levels. Finally, utilities will benefit from better communication with AHJs to understand where EVSE is installed for better system planning.

The biggest opportunity for developers to mitigate the risk of delay and cost increases from permitting challenges is to engage in the permitting process as part of site selection.

34 Montgomery County’s Residential EV Charging Station Permit and Inspection Process is available at https://www.montgomerycountymd.gov/DPS/Process/rci/residential-EV-charging.html.

**Figure 12: Six Ways to Streamline EV Permitting**

- **1 Embrace Statewide Standards**
  - Get everyone on the same page.
  - Standards reduce ambiguity and increase planning opportunities.

- **2 Simplify the Process**
  - Create checklists, toolkits and online resources.
  - These tools guide and set expectations for design and permitting.

- **3 Utility Leadership**
  - Educate authorities having jurisdiction (AHJs) on EV charging technology, safety, and benefits.
  - Advocate for consistent land use compliance, permitting processes, and building codes at the regional and state levels.

- **4 Spot Challenges Early**
  - Collaborate to identify potential challenges before they are costly mistakes.
  - Review design, future considerations, benefits, and potential requirements like ADA and snow removal.

- **5 Smart Site Selection**
  - AHJs should engage with local utilities to pick the best locations for connectivity.
  - Smart siting mitigates the risk of delay and cost increases.

- **6 Understand Overlaps**
  - Consider federal, state, and regional rules and regulations that overlay local permitting.
  - Make permitting expectations easy to understand.
Utility Best Practices for EV Infrastructure Deployment

Working with local authorities, and potentially engaging with land use professionals, early in the process can help identify potential challenges before they become costly mistakes. Developers should not assume the AHJs will have experience or understand EVSE. Plan to engage with AHJs directly, walking through the design, providing future considerations, and explaining how it will be beneficial to their jurisdiction. Successful EVSE developers invest in getting ahead of the curve to educate AHJs on what other states have adopted, such as ADA, parking, snow removal, and impacts on vegetation requirements.

AHJs have an opportunity to create thoughtful EVSE permitting requirements that will encourage responsible, beneficial, and cost-effective charging infrastructure deployment in their communities. As part of city planning, AHJs can engage with local utilities to understand the best locations for the community and electric connectivity and work out ways to streamline permitting and upgrading services. AHJs need to also consider federal (e.g., ADA), state, and regional rules and regulations that overlay local permitting needs to develop transparent expectations for developers, which ultimately streamline processes and reviews for successful permit issuance.

Standards and Interoperability

Standardization and interoperability are critical considerations for utilities and stakeholders when developing charging infrastructure, creating positive customer charging experiences with EV drivers, and supporting competition and innovation in the EV charging product and services market. The three primary dimensions of standardization and interoperability are:

1. **Physical charging port connectors.** Level 2 charging has a broad industry standardization around the SAE J1772 (IEC Type 1) connector. For DCFC, the industry is coalescing around the Combined Charging System (CCS) connector, with the exception of a few Asian automakers continuing to use the CHAdeMO connector. Most public DCFC stations provide ports for both CCS and CHAdeMO-equipped EVs. Tesla vehicles have their own connectors and have adaptors available so drivers can use J1772 and CHAdeMO public charging ports. Additional standards support overhead heavy-duty charging. While there is convergence to CCS in Europe, no national policy exists that requires a single standard in the United States in the foreseeable future.

2. **Payment interoperability and standardization for driver roaming.** Roaming agreements among different EV charging station network operators are proliferating, allowing members of one charging network to use other networks without having to create separate accounts. Open Charge Point Interface (OCPI) is the primary payment interoperability protocol used to facilitate these inter-network roaming agreements and functionality in North America. The ability for public charging stations to accept some form of credit card payments is also a foundational element of payment interoperability for those who are not members of a particular charging network or who do not have smartphones, for example.

3. **Hardware and software communication interoperability and standardization.** The industry is coalescing around the Open Charge Point Protocol (OCPPP) for communication between the charger and back-end software networks, however some operators continue to use proprietary communication protocols. Other important open protocols are: OpenADR, which is used for communicating smart charging and demand response signals to network operators; ISO 15118, which is the protocol many automakers are adopting to support vehicle-to-grid; and Plug and Charge, which provides the ability of an EV to automatically communicate with the charger over the charging cable to authenticate payment, charging needs, and preferences. For example, Tesla currently provides something akin to Plug and Charge. A future objective would be that all EV drivers have this seamlessness and convenience across all charging stations with every EV model type, particularly those subsidized by taxpayer or ratepayer funds.

The charging standards issued by various organizations focus on communications, charge control like vehicle grid integration, cybersecurity, the inductive or wireless charging method, and the conductive or wired charging method, which is the prevalent EV charging method in use today. In addition, battery swapping techniques are emerging as alternative methods in EV charging infrastructure. The organizations that have issued EV charging standards or have work in progress include:

- Charging Interface Initiative (CharIN)
- Electricity System Operator (ESO)
- Institute of Electrical and Electronics Engineers (IEEE)
- International Electrotechnical Commission (IEC)
- National Institute of Standards and Technology (NIST)
- Society of Automotive Engineers (SAE)
- Underwriters Laboratories (UL)
Some examples of their charging standards include:

- **IEC 61851-1 Ed. 3.0**: the general requirements for the conductive charging system for charging at standard AC supply voltages up to 1,000 volts and DC voltages up to 1,500 volts. The standard was designed to provide all the information significant to the construction of a charging infrastructure.

- **IEC 61980-1 Ed. 1.0**: applies to the equipment for inductive charging from the grid to EV for the purposes of supplying energy to DERs and/or other on-board electrical systems in an operational state when connected to the grid and for wireless power transfer equipment supplied from on-site storage systems (e.g., batteries, ultra capacitors).

- **IEEE P1547.9**: provides information on and examples of how to apply the IEEE 1547 standard, for the interconnection of energy storage capable of bi-directional real and reactive power flow and EV chargers, with charging attributes that could have power system impacts, (e.g., modulating rate of charge proportionally to system frequency).

- **SAE J2836/1_201907**: establishes use cases for communication between EVs and the grid for energy transfer and other applications.

- **SAE J2894/1_201901**: provides information pertaining to recommended practice for EV chargers, that will enable equipment manufacturers, vehicle manufacturers, electric utilities, and others to make reasonable design decisions regarding power quality. SAE J2894/2 will describe the test methods for the parameters and requirements in this document.

- **SAE J3072_201505**: establishes interconnection requirements for a utility-interactive inverter system, which is integrated into an EV and connects in parallel with an electric power system by way of conductively coupled EVSE. The requirements in SAE J3072_201505 are intended to be used in conjunction with IEEE 1547 Standard for Interconnecting Distributed Resources with Electric Power Systems and IEEE 1547.1 Standard for Conformance Test Procedures for Equipment Interconnecting Distributed Resources with Electric Power Systems.

### Charging Stations Offered in Infrastructure Programs Should be Safety-Certified

Safety should always be the most important consideration when selecting a charging station. The primary function of an EV charging station is to provide electrical safety for the operator and infrastructure throughout the
Utility Best Practices for EV Infrastructure Deployment

charging process, specifically to address the risks of fire and electric shock. After passing all testing and receiving safety certification, the charging station manufacturer's factory is then randomly inspected four times annually by the National Recognized Testing Laboratory (NRTL) which performed the testing and issued the certification.

Utilities should ensure consumers can find NRTL symbols such as ETL or UL on the product labels of their participating EVSE partners. Figure 13 provides an example of an EV charging station label with symbols depicting safety certification provided by Enel X.

7) Conclusion

As the U.S. transportation sector’s shift toward electrification accelerates, it is critical for electric utilities and other EV stakeholders to facilitate this transition effectively, efficiently and equitably. Doing so will require overcoming a variety of market barriers and challenges that utilities are uniquely situated to address, as discussed in this report. All utilities should prepare for an EV future, which will yield significant benefits for utilities, their customers, and broader society.

Improving EV charging infrastructure processes—and access—by incorporating best practices and lessons learned from utilities across the country will support the transition to transportation electrification in the most effective and efficient way possible.

Key takeaways for utilities aiming to improve EV charging infrastructure processes include:

- **Develop a holistic EV strategic plan** that adequately understands EV market conditions, defines the utility role in the market, and includes some or all of the recommended “must do,” “should do,” and “could do” activities.

- **Build a transportation electrification team which ideally works cross-functionally** to leverage the skills of other internal departments to improve program efficacy and customer engagement.

- **Incorporate best practices identified for utility-led EV charging infrastructure projects.** These best practices address the areas of planning, customer engagement, evaluation, design and construction, and customer and regulatory follow-up.

- **Incorporate best practices identified for third-party EV charging infrastructure projects.** These best practices address the areas of internal planning, customer engagement, and design and construction.

- **Consider programs and process improvements that can utilize EVs to benefit lower-income and underserved customers**, and will support transportation and health equity.

- **Be aware that permitting processes and requirements may vary widely**, and seize opportunities to contribute to a more streamlined process.

- **Be aware of existing and pending technical standards**, and set related utility program requirements prudently.

- **Ensure that infrastructure that is deployed, either through utility programs or otherwise, is technologically capable of participating in utility load management programs** to be able to realize and maximize the grid benefits associated with transportation electrification.

Readers should consider joining the SEPA Electric Vehicle Working Group community to participate in this ongoing discussion, to share other best practices not included in this report, and leverage the work of the many utilities implementing EV charging infrastructure programs.

If readers take one message home from this report, it is that utilities are in the driver’s seat with respect to facilitating the deployment of EV charging infrastructure and streamlining processes, and they must exhibit leadership by proactively and strategically supporting and accommodating burgeoning national EV growth. By doing so, utilities stand to gain not only economically, but also by cultivating and maintaining positive relationships with EV customers and other EV stakeholders.

While each utility’s approach to transportation electrification will be unique, helping one another by sharing lessons learned and best practices for improving EV charging infrastructure processes will benefit all EV stakeholders and drive forward EV adoption efficiently.
Appendix: Electric Service Evaluation Template for Electric Fleets

“Electric Service Evaluation Template for Electric Fleets,” prepared by Edison Electric Institute (EEI), in collaboration with the American Public Power Association (APPA) and the National Rural Electric Cooperative Association (NRECA). Published in “Preparing To Plug In Your Fleet: 10 Things to Consider,” October 2019.35

Electric Service Evaluation Template for Electric Fleets

▪ This template is intended for customers that are embarking on a fleet electrification project and are ready to begin evaluating their electric service needs. Filling out as much of the information as possible will help your electric company evaluate the electrical service needs for your project.

▪ You may evaluate multiple locations with a single form if the planned fleet operating profile is the same at each location and the locations are served by the same electric company. If additional space is needed for any question, please attach additional sheets.

▪ This template is NOT intended to replace the standard service request form of any given electric company. Additional paperwork may be required to initiate a formal service request.

▪ This template may be updated periodically. Please check for the latest version here: https://www.eei.org/issuesandpolicy/electrictransportation/Documents/ElectricServiceEvaluationTemplate.pdf

Contact Information

Customer. The customer is typically the organization named on the electric bill.

<table>
<thead>
<tr>
<th>Name of organization:</th>
<th>Service agreement number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric company serving the customer:</td>
<td></td>
</tr>
<tr>
<td>Customer project lead or primary point of contact:</td>
<td></td>
</tr>
<tr>
<td>Title:</td>
<td></td>
</tr>
<tr>
<td>Phone number:</td>
<td>Email address:</td>
</tr>
</tbody>
</table>

Vendor or manufacturer. If you are a vendor, manufacturer, or design consultant filling out this form on behalf of a customer, please fill out the following information. NOTE: a customer must authorize its electric company to share customer information with third parties. This form does not constitute authorization.

| Name of company: | |
| Vendor primary point of contact: | |
| Title: | |
| Phone number: | Email address: |
## Location Information

**Location(s) to be evaluated.** If evaluating a single location, fill out Location 1 and leave the other locations blank. If more than 3 locations are to be evaluated, please attach an additional sheet.

NOTES: Leased properties may require additional coordination with the property owner. If a location is served by a different electric company, a separate form will be needed.

<table>
<thead>
<tr>
<th>Location 1</th>
<th>Street address:</th>
<th>If multiple sites are being evaluated, what is the priority for evaluation of this site? (circle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City:</td>
<td>State:</td>
</tr>
<tr>
<td></td>
<td>ZIP:</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td>Does the customer lease this site? (circle)</td>
<td>If leased, what is the term (years)?</td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location 2</th>
<th>Street address:</th>
<th>If multiple sites are being evaluated, what is the priority for evaluation of this site? (circle)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>City:</td>
<td>State:</td>
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<tr>
<td></td>
<td>ZIP:</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td>Does the customer lease this site? (circle)</td>
<td>If leased, what is the term (years)?</td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
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<tr>
<th>Location 3</th>
<th>Street address:</th>
<th>If multiple sites are being evaluated, what is the priority for evaluation of this site? (circle)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>City:</td>
<td>State:</td>
</tr>
<tr>
<td></td>
<td>ZIP:</td>
<td>HIGH</td>
</tr>
<tr>
<td></td>
<td>Does the customer lease this site? (circle)</td>
<td>If leased, what is the term (years)?</td>
</tr>
<tr>
<td></td>
<td>YES</td>
<td>NO</td>
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**Site diagram:** Please attach to this form a site diagram for each location to be evaluated that identifies where the vehicles are expected to charge. This can be a simple aerial photo (e.g., Google maps) with markings added to indicate parking/charging location.
**Vehicle and Operating Profile Information**

**Operating profiles of vehicles planned to charge at this location.** Please complete a row for each of the unique daily operating profiles for the vehicles that will charge at this location.

<table>
<thead>
<tr>
<th>Vehicle Make and Model</th>
<th>Battery capacity (kWh)</th>
<th>Quantity</th>
<th>Est. Driving Start and End Time(s) (e.g., 9 a.m. to 5 p.m.)</th>
<th>Est. Parking Start and End Time(s) (e.g., 5 p.m. to 9 a.m.)</th>
<th>Est. Charge Duration (hrs.)</th>
<th>Est. Daily Mileage (mi.)</th>
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**Procurement plan.** For each of the vehicles that will charge at this location, please specify the anticipated timing of delivery.

<table>
<thead>
<tr>
<th>Vehicle Make and Model</th>
<th>Quantity</th>
<th>Order placed? (YES or NO)</th>
<th>Anticipated delivery date (mm/dd/yyyy)</th>
</tr>
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**Procurement plans within the next 5 years.** If you are planning to procure additional vehicles to charge at this location over the next 5 years, please describe the type, quantity, and anticipated timing for delivery of these vehicles below.

<table>
<thead>
<tr>
<th>Vehicle Make and Model</th>
<th>Quantity</th>
<th>Estimated timing for delivery (month or year)</th>
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**Sustainability goals.** Does your organization have any longer-term sustainability or environmental goals that may lead to procuring more electric vehicles in the future? If so, please describe below.

...
### Charging Information

**Charging equipment.** If you know the type of charging equipment that will be used at this location, please identify the charging equipment and associate it with the operating profile(s) from Question 4. Each operating profile should have at least one charging equipment type.

<table>
<thead>
<tr>
<th>Charging Equipment Make and Model</th>
<th>Maximum Rated Power (kW)</th>
<th>Quantity</th>
<th>Operating profile(s) from Question 4 for which this equipment will be used (e.g., 1, 2, 3, or 4)</th>
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</table>

**Charging profile.** If the vehicle manufacturer and/or charging equipment vendor has provided an expected charging profile (or “load profile”) for the vehicle(s) and operating profile(s) described on this form, please attach it to this form.

**Separate service for charging.** Are you considering connecting your vehicles to the existing building electrical service, or dedicating a separate electrical service to vehicle charging? NOTE: The electric company may have a recommendation or requirement based on the electrical service needed.

<table>
<thead>
<tr>
<th>Service preference? (circle)</th>
<th>CONNECT TO EXISTING BUILDING SERVICE</th>
<th>NEW ELECTRIC SERVICE FOR VEHICLE CHARGING</th>
<th>NOT SURE/NO PREFERENCE</th>
</tr>
</thead>
</table>

**Managed charging.** Are you planning or interested in scheduling or otherwise managing vehicle charging at this location? If so, please briefly describe the approach below.

**Self-generation and storage.** Are you planning or interested in integrating on-site electricity generation (e.g., solar) and/or energy storage at this location? If so, please briefly describe the approach below.