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REWIRED Project – Initial Findings from Interviews and Literature Review on EVSE Energization and Interconnection

Rural Electric Utility Workflow Improvements for the Rapid Deployment of EVSE (REWIRED)

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EVSE Energization: Challenges and Emerging Opportunities

Rural Electric Utility Workflow Improvements for the Rapid Deployment of EVSE (REWIRED)

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Executive Summary

Electric cooperatives across the United States are experiencing a rise in large load requests—ranging from electric vehicle supply equipment (EVSE) installations to commercial developments and data centers. These projects often bring accelerated timelines, creating pressure on utility workflows that were originally designed for slower-paced, more predictable service applications.

This report presents early findings from NRECA's REWIRED (Rural Electric Workflow Improvements for Rapid EVSE Deployment) initiative. Funded by the U.S. Department of Energy's Vehicle Technologies Office, the REWIRED project aims to help rural electric cooperatives modernize and streamline internal processes for energization and interconnection of EV-related loads. The project supports utilities through applied research, technical guidance, and peer-to-peer learning—emphasizing scalable, cooperative-led solutions. It provides applied research, technical guidance, and peer-to-peer learning—with an emphasis on scalable, cooperative-led solutions.

These initial findings are based on structured interviews and a comprehensive literature review. Importantly, the interviewees—spanning representatives from utilities, technical research organizations, industry associations, EVSE developers and operators, manufacturers, and standards organizations—identified through a combination of REWIRED team outreach and recommendations from the project's Cooperative Advisory Board (CAB). This board, composed of representatives from over 20 electric cooperatives representing diverse regions across the country, ensures that the research remains grounded in real-world operational needs and captures the challenges that co-ops currently face.

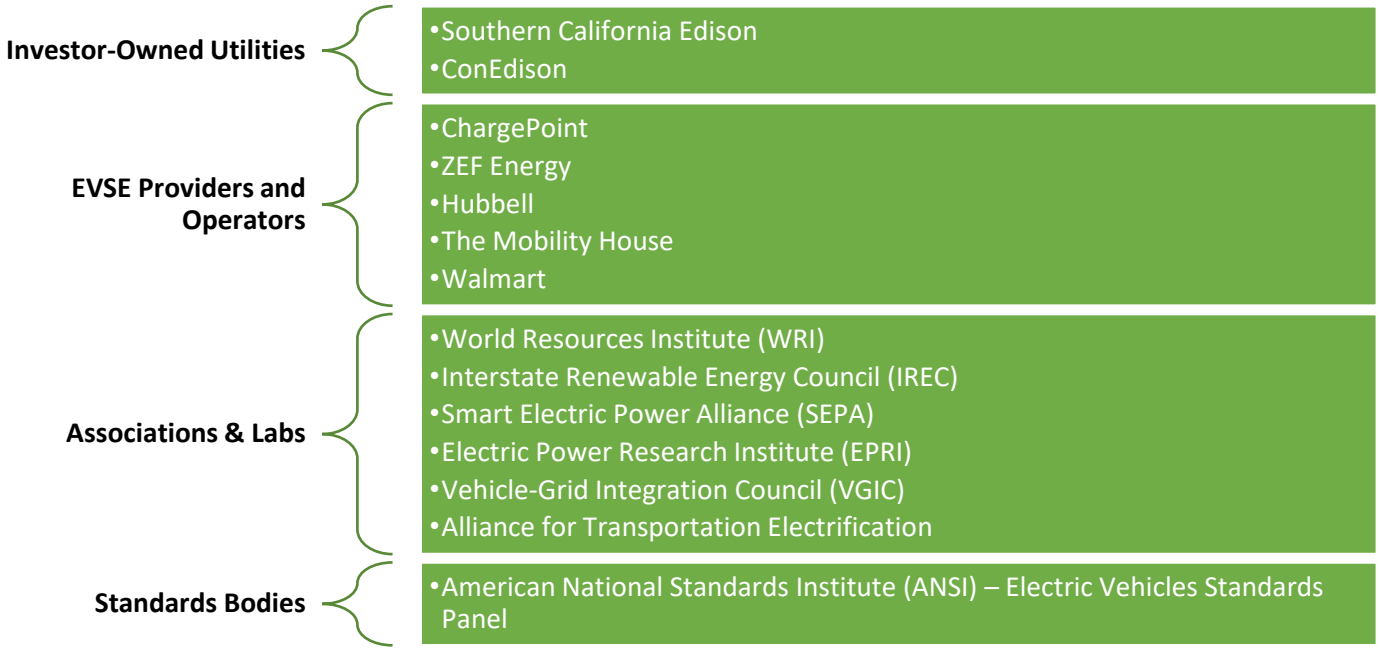
Together, the interviews and literature review produced a comprehensive picture of EV charging energization and interconnection processes identified, utility- and customer-side challenges in these processes, and best practices to improve and streamline these processes. The research also gathered extensive intelligence on a range of issues related to process improvement, such as charging load management, projects with bi-directional power flow, make-ready programs, phased and flexible interconnection, and EV charging standards.

About the Research

To ensure that the REWIRED project directly addresses the real-world needs and constraints faced by rural electric cooperatives, the research team conducted more than a dozen structured interviews and a thorough literature review informed by practical, on-the-ground experience. Rather than conducting research in a vacuum, the REWIRED team relied on a Cooperative Advisory Board (CAB) to guide the direction of interviews, document reviews, and engagement strategies. The CAB, made up of representatives from over 20 distribution and generation & transmission (G&T) cooperatives across varied geographies, market types, and regulatory environments, helped identify pressing issues and recommended stakeholders whose perspectives would inform the project's priorities. The interviewees selected through this process offered both national insight and cooperative-specific relevance.

Why a Cross-Sector Approach?

EV charging deployment is not solely a utility-side issue. It involves a complex interplay of customer needs, market pressures, technical standards, regulatory requirements, and rapidly evolving technology platforms. By engaging stakeholders from across these domains, REWIRED ensures that its findings reflect the full picture of challenges and opportunities, not just internal utility perceptions. The REWIRED team conducted structured interviews with:



This breadth of stakeholder input enabled the project to pinpoint the most common and pressing challenges that stall EVSE deployment, as well as the most effective and innovative solutions. While the

experts spoke about challenges and solutions relevant to the broader utility industry, they also highlighted cooperative-specific insights that can inform the future direction of the REWIRED initiative.

To complement stakeholder interviews, the REWIRED team reviewed dozens of technical research reports, guidebooks, and roadmaps including but not limited to the following:

- **Alliance for Transportation Electrification (ATE)**, *Energizing EV Charging Stations* (a 3-part issue brief series)
- **Interstate Renewable Energy Council (IREC)**, *Paving the Way: Emerging Best Practices for Electric Vehicle Charger Interconnection*
- **Smart Electric Power Alliance (SEPA)**, *The State of Bidirectional Charging in 2023*
- **Electric Power Research Institute (EPRI)**, *Interim Service Solutions and Timely Grid Connections for Large Transportation Electrification Projects*
- **Electric Power Research Institute (EPRI)**, *Simplifying Utility Service Connections for Small Fleet and Multi-Family Housing Electric Vehicle Charging: Research on Challenges and Emerging Leading Practices*
- **Electric Power Research Institute (EPRI)**, *An Electric Vehicle Charging Standards Guidebook for North America*
- **Electric Power Research Institute (EPRI)**, *Electric Transportation Standards Update for 2024*
- **American National Standards Institute (ANSI) Electric Vehicles Standards Panel (EVSP)**, *Roadmap of Standards and Codes for Electric Vehicles at Scale*

The interviews and literature review shaped the observations and insights in this report. Additional references, summaries, and related documents can be found on the REWIRED landing page and updated regularly. Further utility-specific research will be conducted throughout the REWIRED project timeline to develop customized cooperative solutions.

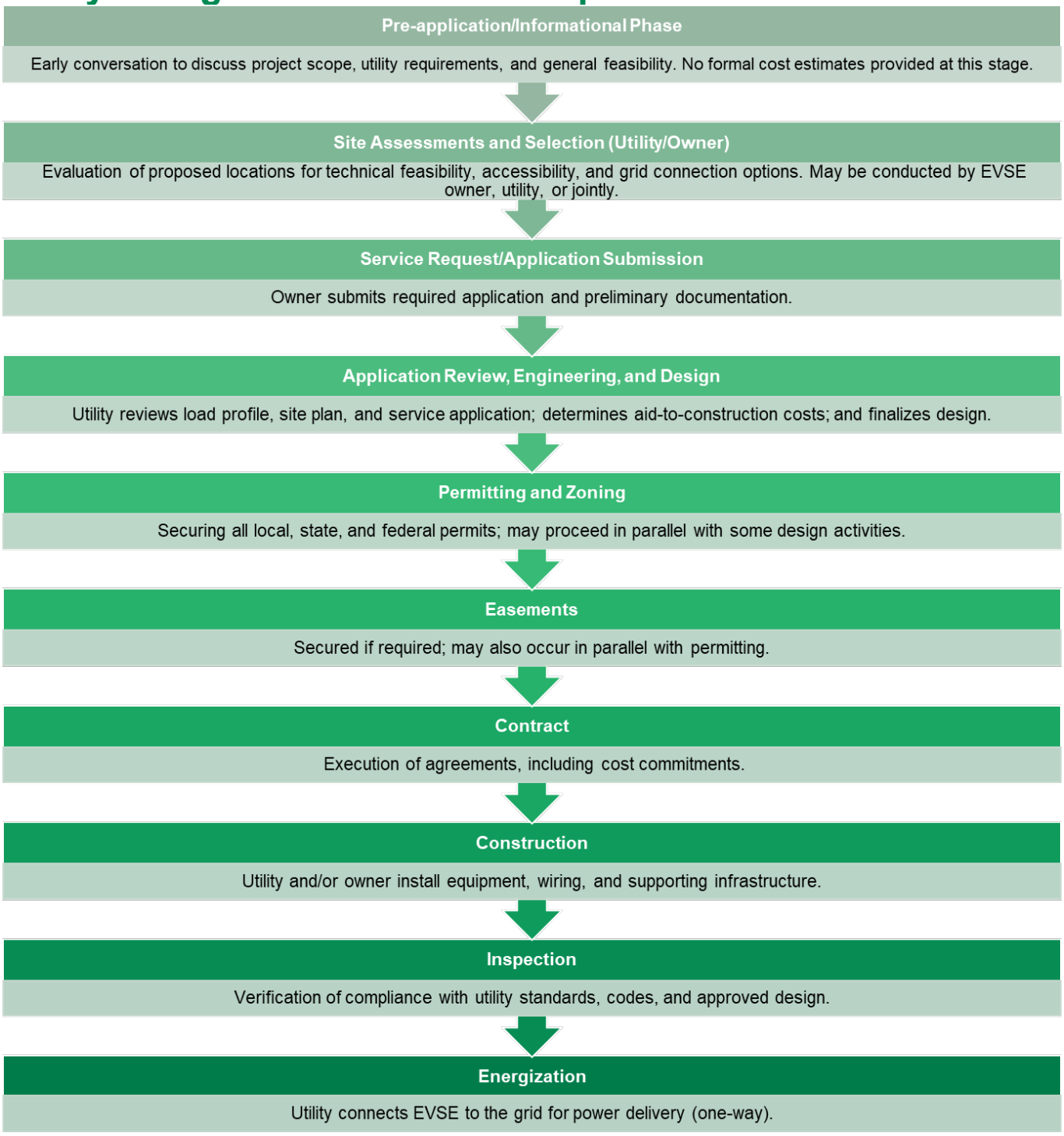
Energization vs. Interconnection

While some industry stakeholders use the terms "energization" and "interconnection" interchangeably, there was general agreement among interviewees that the two have distinct definitions and implications:

- **Energization** is the utility-led process to connect a new EV charging load to the grid and provide power/utility service, most often with one-way power flow.
- **Interconnection** is a broader term that refers to the grid connection process for storage, generating assets, EVs and other distributed energy resources (DER), enabling them to either pull power from grid or feed power back to the grid. It also involves the signing of an interconnection agreement between the utility and the DER owner. It spans projects with either one-way or two-way power flow.

While these two processes may occur in parallel, they involve different requirements, teams, standards, and timelines. Recognizing and clearly defining this distinction can help cooperatives design application workflows, refine internal coordination, and set accurate member expectations. This framing will inform the forthcoming REWIRED guidebook, which will help co-ops better coordinate internal workflows for both load-based and bidirectional assets.

Utility Energization Process: Steps



Note: *While the diagram shows a linear sequence, in practice certain steps (e.g., easements, permitting) may be initiated in parallel to reduce timelines.*

Challenges Identified by Stakeholders

Interviews conducted by the REWIRED team revealed numerous challenges for utilities and customers in EVSE-related energization and interconnection projects.

Utility-Side Challenges

Compressed Project Timelines

Many EVSE projects—especially those involving DC fast chargers, fleet electrification, or national retail chains—come with aggressive timelines. It's possible to deploy EVSE in just weeks that could require as much demand as a large building that takes years to build. In contrast, typical utility service request processes span 18–24 months. In addition, many developers and charging operators prioritize speed to market, placing added pressure on utilities to meet deadlines. This combination can strain internal utility processes, particularly when critical steps such as engineering studies, easement acquisition, and equipment procurement and installation cannot realistically be expedited.

Cross-Departmental Complexity and Silos

The review of EVSE service requests is often complex, involving multiple utility departments, such as system planning, distribution engineering, metering, construction, member services, and legal. When there is no clearly defined handoff structure or centralized case manager overseeing the process, projects can be delayed due to miscommunication, unclear responsibilities, or lack of process ownership.

Supply Chain Challenges

Energization has been delayed by long, extended and sometimes unpredictable lead times for equipment such as transformers and switchgear. Some cooperatives reported delays of six months or more for transformers—particularly for higher-capacity units needed to serve clustered fast chargers. This makes it difficult for utilities to confidently commit to energization timelines.

Staffing Limitations and Specialized Skills Gaps

Cooperatives often operate with lean engineering and operations teams. For many, dedicated EVSE or DER personnel are not available, so existing staff must divide their time between traditional grid planning responsibilities and newer electrification projects. Smaller co-ops may lack internal staff with the expertise to review Level 3 charger specifications, modeling power quality impacts, or navigating vehicle-to-grid interconnection. While some co-ops engage consultants or G&T partners for these tasks, this reliance can introduce additional coordination needs and dependencies.

EV Load Forecasting

Utility EV load forecasting is challenged by the the absence of historical load profiles for large-scale transportation electrification projects, along with numerous variables that influence charging behavior. This often leads utilities to make conservative or worst-case planning assumptions— for example, using nameplate charger capacity for peak load calculations rather than incorporating managed charging strategies or realistic operational scenarios. Such assumptions can result in larger-than-needed capacity estimates, decisions to overbuild grid infrastructure, longer project timelines, and higher costs.

Considerations for Co-ops:

Consider establishing a clear, cross-departmental EVSE workflow with defined roles, adopt a flexible forecasting approach for transportation electrification using scenario-based planning and local data, and implement a standardized communication protocol with developers and permitting authorities to reduce delays and improve project coordination.

Consumer/Member-Side Challenges

Lack of Process Standardization Across Utilities

Many commercial EV charging developers aim to scale operations across multiple states and utility service areas. They are challenged by the reality that each utility has different energization and interconnection processes, timelines, requirements, and application formats. This inconsistency complicates efforts to standardize construction workflows, develop reliable budget forecasts, and project energization dates.

Mismatch in Timelines for EV Utility Service

There is a mismatch between the time it takes to plan and purchase a fleet of EVs (typically 6-12 months) and the time it takes for utilities to provide electric service and grid upgrades for the new load (often 18-24 months and up to 3-5 years if substation upgrades and line extensions are needed). This timeline gap—commonly 12–18 months—can leave site hosts with stranded assets, meaning EVs that cannot be placed into service because EVSE deployment and energization have been delayed. In some cases, these delays cause manufacturers and customers to postpone or cancel electrification plans.

Difficulty Navigating Utility Processes

Customers frequently face a lack of clarity from utilities on process steps, requirements, and timelines. They may also find it difficult to identify the correct contacts or receive consistent updates without a designated single point of contact for EV charging projects. When utility processes involve multiple internal teams without clear coordination, it can be challenging for customers to track project progress and resolve issues.

Supply Chain Challenges

Some utilities are required to receive payment from customers before ordering certain transformers, resulting in delays. Customers also reported limited visibility into transformer lead times. Additionally, many utilities do not permit large customers to bulk-purchase transformers for use in multiple projects, further extending energization timelines. On the customer side, panels, power receptacles, and other equipment may also have long procurement lead times.

Restrictions on Project Future-Proofing

Some utilities restrict oversizing transformers and conduit, making it difficult to future-proof projects with planned expansions. Some customers are unwilling to oversize pads for padmount transformers in case of future upgrades.

Utility Design and Construction

Energization timelines can be extended when utility design work begins late in the process or when construction scheduling is delayed due to competing priorities or resource constraints.

Permitting and Site Acquisition Barriers

Many projects are delayed due to land acquisition, permitting, and third-party easements.

Considerations for Co-ops:

Consider providing clear application guidance, proactively communicate timelines and costs, and offer pre-application consultations or screening tools to help members. Also, partner with community economic development organizations to break down barriers and leverage local knowledge for site identification and acquisition.

Emerging Solutions for Cooperatives and Rural Utilities

The interviews and literature review uncovered promising practices for cooperatives and customers to streamline EVSE deployment and interconnection:

Early and Proactive Engagement

Cooperatives can take a proactive approach by initiating to customers such as fleets, airport car rental facilities, key accounts, and regional developers and gather information on their electrification plans. Outreach methods may include scheduled meetings, phone calls, and targeted surveys. These efforts help identify emerging load hotspots, inform long-term load forecasting and grid planning, guide strategic capacity additions in select areas, and strengthen member relationships.

Cooperatives can also encourage members to contact them for informal, exploratory conversations before site selections and submission of service requests. These early conversations provide an opportunity to review the member's or key account's operational schedules, duty cycles, and minimum viable power needs—potentially leading to cost-saving adjustments in project design. They also help members align more effectively with utility processes and requirements while building trust on both sides.

Single Utility Point of Contact

A single point of contact or EV charging project manager shepherds EVSE projects from start to finish, coordinating among multiple utility departments. This role may involve guiding members through the energization process, attending site visits, assisting with site selection and permitting issues, advising on optimal site design, and exploring alternative solutions to address grid capacity limitations.

Websites and Customer Portals

Cooperative websites dedicated to EV charging can provide members with informative resources to help them more efficiently plan, finance, design, and deploy their projects. Resources may include case studies, incentive opportunities, information on EV charging rates and managed charging, energization process flow charts, lists of documents required in service applications, site plan specifications, lists of approved contractors and EVSE projects, standard easement language, and more. Cooperatives can also provide online energization/interconnection portals where members can submit documents and view project history, current steps in the process, pending items, and responsible parties.

Pre-Application Project Reviews

Some cooperatives and utilities offer preliminary, pre-application "desktop reviews" of capacity availability, points of connection, and cost estimates for multiple sites under consideration. This service enables members to compare potential sites and select those with the most viable and cost-effective paths to energization.

Future-Proofing Projects

Cooperatives can work with members to design sites and associated infrastructure to accommodate future growth plans. They can also consider implementing oversizing policies that focus on low-risk,

cost-effective measures—such as installing spare conduit, upsizing conductor, and preparing larger transformer pads —while avoiding high-cost equipment oversizing unless supported by firm plans.

Solutions to Navigate Grid Constraints

When grid upgrades or new infrastructure requires extended timelines to complete, utilities can work with customers to implement "bridging" solutions that enable at least partial operations while the full capacity buildout is underway. These approaches help avoid project delays, support phased business openings and reduce stranded investment risk.

One common approach is flexible and phased interconnection, where the utility energizes the permanent service in stages to align with available grid capacity. This allows some chargers or equipment to go live while the remaining load is brought online after upgrades are complete. Customers can also deploy distributed energy resources (DER)—such as on-site solar, battery storage, or backup generation—or adopt load management systems to dynamically limit power draw during peak periods. These measures can reduce the strain on existing infrastructure and allow more load to be served without triggering immediate system reinforcements. While some utilities use the term "temporary service," this generally refers to a separate, low-capacity (often single-phase) connection used during construction for powering job trailers, lighting, and small tools—not for operating EVSE or other high-load equipment.

By combining staged utility interconnection with customer-side flexibility measures, both parties can keep projects moving forward while ensuring the grid is ready for long-term, full-capacity operation.

Strategies to Address Long Transformer Lead Times

Utilities can maintain a stock of common transformer sizes, allow large customers to bulk-purchase or reserve transformers reasonably early in the process, standardize transformers used for EV charging stations, and deploy smaller transformers that enable customers to energize and meet some of their charging needs. Additionally, utilities can work with customers to pre-pay construction-in-aid costs.

Collaboration with Permitting Authorities

By coordinating EVSE construction schedules with local authority (AHJ) paving or infrastructure projects, utilities may be able to shorten permitting-related delays. Developing strong relationships with local inspectors and permitting offices can also lead to faster approvals and more predictable review processes.

Conclusion

The research findings outlined in this report—developed through interviews, literature reviews, and feedback from experienced cooperative experts—illustrate the challenges in energization/interconnection processes and practical, innovative solutions emerging across the utility landscape.

These insights represent only the first phase of the REWIRED project. The project will continue to work closely with its Cooperative Advisory Board (CAB), leveraging ongoing research, technical tool development, and peer exchange to refine, test and distribute scalable solutions tailored to cooperative realities.

Planned deliverables include a comprehensive utility-facing guidebook and an EVSE assessment dashboard—both designed to support faster, more efficient decision-making and reduce soft costs for cooperatives.

Additional Resources

- **NRECA EV Website**
- **REWIRED Website**
- **Summary of NRECA EV Resources for Electric Cooperatives**
- **NRECA EV Consulting**
- **NRECA *Business and Technology Update* newsletter – sign-up**