NRECA
America's Electric Cooperatives

REWIRED: Rural **E**lectric Utility **W**orkforce **I**mprovements for **R**apid **E**VSE **D**eployment **Annotated Bibliography**

August 2025

Alliance for Transportation Electrification (ATE). (2024). Energizing EV Charging Stations: Issues Brief 3 in a Series.

https://evtransportationalliance.org/wp-content/uploads/2024/04/FINAL-Interconnection-Issue-Brief3.pdf

In this Issues Brief, ATE discusses the pre-planning and pre-construction process. They emphasize that working together can optimize the development process with the goal of expediting EV infrastructure build times. The Brief discusses the opportunity for the utility and the customer and host site to engage early and often in a constructive dialogue. ATE encourages the use of on-line technologies as well as single-points-of contact in each organization to help facilitate a more streamlined process. ATE also summarizes best practices for utilities, developers, and government entities.

Additional papers and other related publications of the Alliance are available at www.evtransportationalliance.org.

Alliance for Transportation Electrification. (2023). Energizing EV Charging Stations: Issue Brief 1.

https://evtransportationalliance.org/wp-content/uploads/2023/04/FINAL-ATE-Interconnection-Brief-1.pdf

This issue brief provides a detailed description of the process for energizing public electric vehicle (EV) charging stations, the challenges that hinder achieving this advantage, and the best practices involved. It describes the functions of utilities, EV service providers, host sites, and governments in the interconnection process. Several of the report topics include pre-planning, site selection, permit issues, supply chain, and workforce requirements. It also highlights regulatory and operational barriers and provides suggestions for implementing more effective measures. It will be

helpful to policymakers, utilities, and stakeholders who want to expedite EV infrastructure development to satisfy the increasing demand in the market.

American National Standards Institute (ANSI). (2023). Roadmap of Standards and Codes for Electric Vehicles at Scale. https://www.ansi.org/standards-news/all-news/2023/06/6-15-23-ansi-publishes-roadmap-of-standards-and-codes-for-electric-vehicles-at-scale

ANSI developed this roadmap with technical assistance from the United States Department of Energy (DOE) Office of Energy Efficiency & Renewable Energy (EERE) Vehicle Technologies Office (VTO), and Argonne National Laboratory (ANL), along with many other contributors listed in the report. The goal is to create a platform for a cohesive approach to future standards development for EV's. This roadmap intends to describe the current and desired future standardization landscape that will support and facilitate EVs at scale. It identifies key safety, performance, and interoperability issues, and makes recommendations to address high, medium, and low priority gaps in codes and standards as defined in the report.

Desai, R. (2024). ***EVI-LOCATE One Stop Solution for Estimating Cost of Installing EV Charging Stations*****.** Nrel.gov. https://docs.nrel.gov/docs/fy24osti/89217.pdf

This paper presents EVI-LOCATE, an online platform that simplifies the planning, design, and estimation of the costs associated with installing EV charging stations. It enables them to define the location area of the site, select the type of chargers to be installed, and then estimate the local cost of placing that charger into the ground using ArcGIS, followed by RSM, means, and the GSA prices scheduler. EVI-LOCATE accelerates project delivery by streamlining costs and providing detailed estimates in just a few minutes. This enables agencies to smooth out the process of EV infrastructure and have it prepared in record time.

Electric Power Research Institute (EPRI). (2024). An Electric Vehicle Charging Standards Guidebook for North America. https://www.epri.com/research/programs/053122/results/3002029530

EPRI created this report specifically for designers of electric vehicle charging systems and infrastructure and those looking for understanding and clarity of the standards for EV charging and the operation of EV chargers. The report offers knowledge of standards documents necessary to design charging systems that are reliable, fully operable, and standards compliant. A comprehensive review of the SAE J1772™ Conductive Charging Coupler is presented in the report.

Electric Power Research Institute (EPRI). (2024). Electric Transportation Standards Update for 2024.

https://www.epri.com/research/programs/053122/results/3002029898

EPRI intended this report for utility personnel interested in EV charging standards, electric vehicle charging system developers and charging equipment developers. The purpose of the report is to provide a detailed inventory of standards used in the electric transportation space, and to highlight key standards and how they support electrification. This report provides a thorough overview of standards for the electric transportation space, an in-depth list of standards with descriptions, and web links to specific standard objectives. This update is current as of Q4 2024 and covers nearly five hundred transportation electrification standards from more than twenty organizations.

Electric Power Research Institute (EPRI). (2024). Interim Service Solutions and Timely Grid Connections for Large Transportation Electrification Projects

https://www.epri.com/research/products/000000003002030647

EPRI's report is based on interviews with utilities, fleets, OEMs, service providers, and other stakeholders in the Transportation Electrification (TE) industry. TE projects face challenges for utilities regarding timely electric service to customers, specifically for fleet customers with Medium and Heavy Duty (MHD) trucks and/ or those requiring the charging of large numbers of light duty vehicles. The timing mismatch between the lead time required for customers to procure electric vehicles (EVs) and install customer-owned ("behind-the-meter [BTM]") charging infrastructure, and

the time required for utilities to provide electric service for the new load is quickly becoming an issue as fleet electrification and large public charging depots scale in size and number. The report highlights underlying factors impacting service connection timeliness, best practices, and recommendations to minimize the impact of utility service capacity on the deployment of EVs. EPRI presents recommendations and observations and assesses interim solutions to bridge the timeline gaps.

Electric Power Research Institute (EPRI). (2025). Simplifying Utility Service Connections for Small Fleet and Multi-Family Housing Electric Vehicle Charging.

https://www.epri.com/research/programs/053122/results/3002031384

EPRI's collaborative report is part of the U.S. Department of Energy (DOE) funded Charging Infrastructure Interconnection Streamlining Resource (CIISR) project, which focuses on small fleets and multi- family housing (MFH) customers. It is intended for utilities involved in EVSE energization or new service connection processes, fleet advisory services or other EV commercial customer-facing utility roles, and EV program developers; commercial customers likely to have relatively small EV charging load, including MFH property managers and businesses with small vehicle fleets; industry stakeholders including EV service providers, EV supply equipment providers, and nonprofits and others working to streamline processes to achieve EVs at scale. The objective of this work is to understand gaps and opportunities to improve EVSE energization timelines and experiences to develop a roadmap streamlining EV service connections for these customers, as well as develop and adapt customer support resources.

Electric Power Research Institute. (n.d.). Electric Vehicle Load Forecasting and Grid Planning Tool. Eroadmap.epri.com. https://eroadmap.epri.com/

EPRI has developed a web-based tool called EPRI eRoadMap to assist utilities, transportation planners, and policymakers in estimating the future power and energy demand of electric vehicles

(EVs) on the road. It provides EV feed-in level, EV load, and peak and energy forecasts through to 2030, along with fully electrified, carbon-free scenarios. Users are allowed to view multiple layers of data, including charging infrastructure, air quality zones, utility service areas, and disadvantaged communities. The aid facilitates strategic planning, as laying out on the grid is related to the growing number of EVs, allowing stakeholders to make informed decisions regarding planning expenses and investments in infrastructure development.

Electric Power Research Institute. (2025). ***EPRI's Vetted Product List – A Comprehensive Resource of Vetted Products for the Electric Vehicle Equipment Industry*****. Epri.com.** https://www.epri.com/vpl

The Electric Power Research Institute (EPRI) maintains the Vetted Product List (VPL). This up-to-date and centralized list evaluates electric vehicle supply equipment (EVSE) and related hardware based on their quality and compliance with relevant standards. This list is created based on criteria formed through industry consensus, utility input, and government regulatory needs, allowing utilities, state agencies, and other industry stakeholders to obtain well-vetted product information. Vendors will have a standard application process to submit their equipment for consideration. The VPL ensures visibility and harmony, which are maintained through the secure, effective, and compliant implementations of EVSE throughout the country. It is not only the users who need to ensure that trade laws and regulations are observed.

Electric Power Research Institute (EPRI). (2024). ***Electric Transportation Standards Update for 2024.***

https://www.epri.com/research/programs/053122/results/3002029898

EPRI intended this report for utility personnel interested in EV charging standards, electric vehicle charging system developers and charging equipment developers.

The purpose of the report is to provide a ***detailed inventory of standards*** used in the electric transportation space, and to highlight key standards and how they support electrification. This report provides a thorough overview of standards for the electric transportation space, an in-depth list of

standards with descriptions, and web links to specific standard objectives. This update is current as of Q4 2024 and ***covers nearly five hundred transportation electrification standards from more than twenty organizations.***

Electric Vehicle Council (EVC). (2022). ***A Best Practice Guide for EVSE Regulations*****.** https://www.transportationenergy.org/research/reports/ev-regulatory-best-practices

EVC's report explores examples of state policies related to kilowatt-hour charging, public utility definitions, approaches governing EVSE installation, as well as operations. The report provides examples of such policies by state. Localities are also addressed, specifically, permitting, parking, building code, and other technical requirements. This report is intended to provide information on the policy landscape at the state and local level, and to recommend some best practices from regulated utilities that have experience installing and operating EV charging infrastructure.

Energy Systems Integration Group (ESIG). (2024). ***Charging Ahead: Grid Planning for Vehicle Electrification*****.** https://www.esig.energy/grid-planning-for-vehicle-electrification/

ESIG's report focuses on the rapid pace and need for vehicle electrification with a focus on planning practices while keeping in mind grid limitations, public policies, and the possibility of inadequate infrastructure to meet EV charging demands. ESIG offers recommended actions such as improving forecasting, considerations of design standards, proactively upgrading distribution equipment to alleviate future cost burdens, and provides best practices and areas for improvement. Additionally, ESIG hosted a webinar in December2023 to provide an overview of the report. The webinar was recorded and can be accessed here.

EVITP. (2022, July 28). Electric Vehicle Infrastructure Training Program. EVITP. https://evitp.org/

The Electric Vehicle Infrastructure Training Program (EVITP) is a non-profit program that provides electricians with industry-recognized courses and certification in electric vehicle supply equipment (EVSE) installations, enabling them to work throughout North America. The program

helps in installations to achieve the utmost level of safety and quality in terms of efficiency. The curriculum of the EVITP covers topics such as grid integration, NEC compliance, NFPA compliance, utility coordination, and emerging EV technologies. It is compulsory to ensure that electricians who have received their certification have undergone an efficient and intensive 20-hour program of action and passed the rigorous certification exam, which proves they are masters of EVSE deployment. Many automakers, utilities, manufacturers, and labor organizations endorse the certification to ensure a reliable and secure charging infrastructure, now that the use of electric vehicles is becoming more widespread across the continent.

Idaho National Laboratory (INL), Pacific Northwest National Laboratory (PNNL) (2025). EV Charging Infrastructure Energization: An Overview of Approaches for Simplifying and Accelerating Timelines to Processing EV Charging Load Service Requests.

https://inldigitallibrary.inl.gov/sites/sti/sti/Sort_151131.pdf

This report identifies the challenges and provides potential solutions to streamline the process of connecting EV charging infrastructure to the grid. The solutions identified in this report are grouped into four areas to include: increasing data access and transparency; improving energization processes and timing; promoting economic efficiency; and improving grid reliability and resilience. The goal of the identified solutions is to accelerate timelines and decrease costs associated with connecting EV charging infrastructure to the grid.

Interstate Renewable Energy Council (IREC). (2023). IREC Model Interconnection Procedures.

https://irecusa.org/resources/irec-model-interconnection-procedures-2023/

The IREC Model Interconnection Procedures were revised in 2023 to include updated best practices and guidance for the interconnection of DER's and for adopting IEEE Std 1547-2018. IREC aims to streamline processes for interconnection, keeping in mind resource constraints and increased

costs. Additionally, IREC hosted a webinar in September 2023 to provide an overview of these processes and procedures. The webinar was recorded and can be accessed here.

Interstate Renewable Energy Council (IREC). (2022). Paving the Way: Emerging Best Practices for Electric Vehicle Charger Interconnection. https://www.irecusa.org/resources/paving-the-way-emerging-best-practices-for-electric-vehicle-charger-interconnection/

IREC's report offers insights and best practices to facilitate the rapid growth of EV charger deployment. Streamlined processes, standardization of interconnection procedures, regular and ongoing utility coordination all can contribute to reduced timelines and cost as well as quicker deployment. Efficient permitting processes can also speed up project timelines and reduce costs. Enhancing transparency and collaboration through data sharing, incentive programs, technical support for developers, among other best practices are highlighted to support a favorable environment for EVSE deployment and operation.

Joint Office of Energy and Transportation. Public Electric Vehicle (EV) Charging Infrastructure Playbook. https://driveelectric.gov/ev-infrastructure-playbook

This playbook is intended to assist communities, organizations, and a diverse range of groups to plan for and deploy EV infrastructure. Eight interactive modules Include: Developing EV Infrastructure Plans, Engagement, Deployment Strategies and Site Identification, Costs and Funding, Policies and Incentives, Regulations for Zoning, Permitting, and Codes, Procurement, Ownership, and Operation, and Revenue and Fee Structures. The playbook features activities, videos, and additional resources for each module.

Additional Resources from Joint Office of Energy and Transportation

Technical Assistance Help Sheet: Battery Energy Storage for Electric Vehicle Charging Stations https://www.nrel.gov/docs/fy24osti/89493.pdf

Technical Assistance Help Sheet: Physical Safety and Security at Electric Vehicle Charging Sites https://www.nrel.gov/docs/fy24osti/90150.pdf

Joint Office of Energy and Transportation. (2024). ***Physical Safety and Security at Electric Vehicle Charging Sites*****.** Nrel.gov. https://docs.nrel.gov/docs/fy24osti/90150.pdf

The document is a technical assistance help sheet on best practices and design requirements for protecting and safeguarding physical safety against electric vehicle (EV) charging sites. It emphasizes the need for accessibility, sufficient brightness, easy visibility, a surveillance system, emergency call boxes, tamper-resistant equipment, and good landscaping to foster user confidence and deter vandalism. In addition, it demonstrates that equipment protection is imperative, emergency shut-off, the PPE regulations, and safety regulation (NFPA and NEC) have to be taken into account, and also response (personnel) training is crucial. The paper also proposes solutions for incorporating these safety measures into the permitting process, grant application, and third-party contractual agreements.

National Renewable Energy Laboratory (NREL). (2024). Soft Cost Analysis of EV Charging Infrastructure Informs Transition. https://www.nrel.gov/news/program/2024/soft-cost-analysis-of-ev-charging-infrastructure-informs-transition-to-an-electric-fleet.html

An initiative led by the U.S. Department of Energy's (DOE's) National Renewable Energy Laboratory (NREL) with Lawrence Berkeley National Laboratory and Idaho National Laboratory was formed to achieve soft cost reductions for EVSE installations. The project aims to reduce soft costs for EVSE installation by identifying, benchmarking, and tracking relevant soft costs that will facilitate deployment of a nationwide network of chargers. The research team has developed the tool linked below and will continue to provide relevant and useful research and insights into reducing soft costs to expedite the build out of charging infrastructure.

NREL's EVI-X Modeling Suite of Electric Vehicle Charging Infrastructure Analysis Tools

Additional Resources from NREL

NREL developed this tool to help estimate the costs of installing EV charging stations. https://www.nrel.gov/docs/fy24osti/89217.pdf

Electric Vehicle Infrastructure — Locally Optimized Charging Assessment Tool and Estimator (EVI-LOCATE) https://evi-locate.nrel.gov/

National Renewable Energy Laboratory. (2024). ***Battery Energy Storage for Electric Vehicle Charging Stations*****.** Nrel.gov. https://docs.nrel.gov/docs/fy24osti/89493.pdf

The technical assistance source will explain how the battery energy storage system (BESS) can make the fast charging electric vehicle (EV) fast charging station a reality, with the following advantages of reducing the associated grid dependence with fast charging by lowering the cost of operations and providing resiliency in the event of disruptions. The document describes battery-buffered fast charging, noting that it allows for cutting grid service capacity demands by 50 to 80 percent without sacrificing charging performance. It also discusses risks, sizing based on the conditions referred to as First Hour and Design Day, and includes reference tables to assist with deployment. The guide encourages interested parties to utilize Joint Office technical assistance when designing battery-integrated EV charging infrastructure.

NREL. (2025). EVI-X Modeling Suite of Electric Vehicle Charging Infrastructure Analysis Tools. Nrel.gov. https://www.nrel.gov/transportation/evi-x

The EVI-X Modeling Suite is a set of high-performance tools developed by NREL that are used to plan, design, and incorporate the cost of electric vehicle (EV) charging infrastructure, taking into account the financial aspect. Such instruments enable a smooth electric vehicle charging network at various levels among different stakeholders, including utilities, policymakers, fleet operators, and investors. The modules of the suite include network planning, site design, and financial analysis, which consist of grid impact, dynamic road feasibility, behind-the-meter storage, cost analysis, and

investor risk assessment. The EVI-X can be used to facilitate evidence-based decision-making, enabling the speedier adoption and deployment of the required infrastructure.

Pacific Northwest National Laboratory (PNNL), National Renewable Energy Laboratory (NREL). (2024). ***Draft i2X Distributed Energy Resource Interconnection Roadmap: Identifying Solutions to Transform Interconnection by 2035*****.**

https://www.energy.gov/sites/default/files/2024-09/Draft%20DER%20Interconnection%20Roadmap%20for%20RFI.pdf

This draft roadmap contains information to facilitate discussion around and approaches pertaining to DER interconnection challenges in the next 5 years and beyond. This roadmap is a product of the Interconnection Innovation e-Xchange (i2X) launched by the Department of Energy in June 2022. Challenges preventing interconnection of these resources are discussed and include but are not limited to timeline and process delays, costs, and coordination, incomplete or outdated technical standards, and interconnection rules. The roadmap discusses data collection and sharing, and the resources needed to create and maintain these solutions, as well as other workforce development constraints. Also discussed are other agencies work and findings to improve interconnection, as well as funding efforts to streamline processes and reduce the soft costs for building out a national EV charging infrastructure.

Pacific Northwest National Laboratory (PNNL). (2022). Electric Vehicles at Scale- Phase II Distribution System Analysis.

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-32460.pdf

This report follows the *Phase I* Study which focused on bulk power electricity impacts and showcases methodologies developed during that phase. *Phase II* concentrates on methodologies and EV modeling distribution system data. The data was provided by Southern California Edison. This technical report highlights a new EV adoption modeling methodology for estimating the likelihood of EV adoption at the household level, as well as other tools for estimating EV hosting capabilities for distribution system planning.

Smart Electric Power Alliance (SEPA). (2023). Preparing for Customer Fleet Electrification: A Utility Framework. https://sepapower.org/resource/preparing-for-customer-fleet-electrification-a-utility-framework/

SEPA's report offers a utility fleet electrification framework, developed through cross-industry collaboration to help utilities, fleet owners, operators, and a variety of other relevant groups navigate the rapid pace of fleet electrification. The importance of understanding fleets in your service territory, creating clear utility processes, providing resources and support, increased collaboration and dialogue are key themes. Also addressed are regulatory barriers, data privacy and sharing, zoning, and permitting, among others with clear utility actions that have been identified. Long-term planning to include grid capacity, energy storage, workforce training and stakeholder engagement are an important part of the framework as we look into the future of EV expansion.

Accompanying Case Studies include:

Providing EV Load Capacity Maps (2023)

Partnering to Electrify Public Fleets (2023)

Streamlining Electrification Processes and Timelines (2023)

Understanding Fleets in Your Service Area (2023)

Smart Electric Power Alliance (SEPA). (2023). The State of Bidirectional Charging in 2023. https://sepapower.org/resource/the-state-of-bidirectional-charging-in-2023/

SEPA's collaborative report provides an overview of the current state of the bidirectional charging industry in the U.S. SEPA highlights perspectives from electric utilities, vehicle OEMs, charger manufacturers, software providers, and project implementation providers, explores existing bidirectional charging deployments, and explains the opportunities and barriers that exist to wide-scale adoption of bidirectional charging. The report also discusses policies and regulations, the

technology and vendor landscape, and provides recommendations for utilities, manufacturers, and industry.

Smart Electric Power Alliance (SEPA). (2020). Utility Best Practices for EV Infrastructure Deployment. https://sepapower.org/resource/best-practices-for-utility-ev-infrastructure-deployment/

SEPA provides guidance for how utilities can develop an effective strategic plan to support EV charging infrastructure and deployment. Best practices for utilities are provided in this report pertaining to program planning, customer engagement, site evaluation and project construction. SEPA also discusses best practices for deployment of customer-side EV charging infrastructure, while navigating the utilities' role in the planning, engagement, and build outs.

Smart Electric Power Alliance. (2023). Partnering to Electrify Public Fleets: A Case Study with Orlando Utilities Commission and LYNX Public Transit. *SEPA.* SEPA. https://sepapower.org.

The case study examines the effective partnership between the Orlando Utilities Commission (OUC) and LYNX Public Transit in developing a plan to convert a portion of LYNX Public Transit's bus fleet to electric transportation. It outlines how collaborative planning efforts, the establishment of high-power charging infrastructure, and the sharing of data increased the efficiency of operations. The report highlights reciprocity, whereby there will be win-win outcomes, including enhanced fleet management by LYNX and valuable operational lessons that OUC will utilize in any future electrification initiatives. Moreover, the case highlights the societal and ecological impact of electrifying the public transportation system, which can serve as a model for utilities and transit regulatory agencies to prioritize clean transportation systems.

Smart Electric Power Alliance. (2023). Streamlining Electrification Processes and Timelines: A Case Study with Orange and Rockland. SEPA. https://sepapower.org.

This case study examines how Orange and Rockland Utilities (O&R) enhanced their activities in providing EV charging infrastructure by automating these processes to improve overall

application, approval, and project management. The paper describes how O&R minimized the number of process activities, enhanced the ability to perform parallel processes, and streamlined the customer service experience, resulting in a 40 percent improvement in project times. The advantages were that it was a more efficient system, facilitated more effective communication, and allowed for the allocation of resources to both the utility and the consumer. The report also illustrates the development of more effective hosting capacity maps to encourage site developers. The model provides viable solutions to utilities that enable them to expedite the development of EV infrastructure.

Smart Electric Power Alliance. (2023). Understanding Fleets in Your Service Area: A Case Study with DTE Electric. SEPA. https://sepapower.org

In the case study, the company reviewed how DTE Electric implemented its fleet electrification using data analytics and custom messaging. The available services have helped DTE identify over 1,500 potential fleet candidates and offer advisory services to customers, enabling them to assess the feasibility of the EV transition through the creation of the eFleets Total Cost of Ownership (TCO) tool. The paper illustrates how being proactive, personalized, and flexibly supportive leads to excellent relationships with fleet managers, resulting in reduced electrification times and improved plans for the system. The model has the potential to help utilities transition to EVs promptly.

Key Standards Identified in Interviews

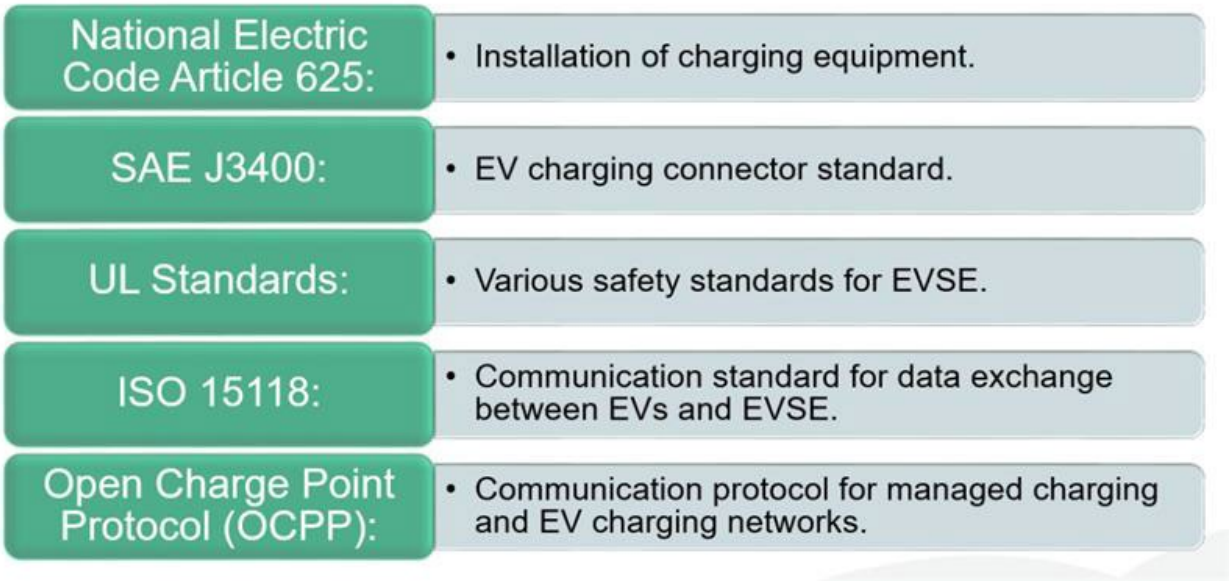

Table 1: A ***Comprehensive List of Standards, Recommended Practices, and Other Documents*** related to Electric Transportation.

Descriptive abstracts were obtained from Standards organization websites. ***Links provided.***

National Electric Code 625

https://cdn.lsicloud.net/warshauers/EV%20Chargers/Article-625.pdf
https://code-authorities.ul.com/wp-content/uploads/2014/04/UL_electricvehicles2.pdf

SAE J3400

https://driveelectric.gov/charging-connector
https://www.sae.org/standards/content/j3400_202409/ REVISED 9/30/2024

UL Standards

https://explorestandards.ul.org/electric-vehicles.html

ISO 15118

https://www.iso.org/standard/69113.html
https://www.iso.org/standard/77845.html
https://www.evconnect.com/blog/iso-15118-and-ev-adoption

Open Charge Point Protocol (OCPP)

https://openchargealliance.org/protocols/open-charge-point-protocol/