Understanding State-Level Regulatory Considerations for Electric Vehicle Supply Equipment in South Carolina

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The Nicholas Institute for Environmental Policy Solutions
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Abstract

Electric vehicle (EV) demand in the U.S. is growing. With this growth comes increased demand for public charging infrastructure, or electric vehicle supply equipment (EVSE). States in the Southeast generally fall behind other states in EV adoption and public EVSE deployment from a lack of policy support and funding incentives. Ambiguity around aspects of regulation creates additional challenges for implementing supportive policies and programs. Through state-level policy analysis and expert interviews, this project identified current trends and methods used for regulating EVSE in relation to ownership, pricing, and standards for measuring the amount of electricity dispensed. This analysis is intended to provide the state of South Carolina an overview of actions that other states are taking on the matter and to provide recommendations for developing a regulatory plan that fosters growth of EV adoption and EVSE deployment in the region.

Executive Summary

Electrified transportation is the topic of several new policies and proposed legislation across the United States. With the electric vehicle market share growing, states are tasked with developing new regulatory considerations as well. However, there does not seem to be a one-size-fits-all approach to regulating electric vehicles or the supporting infrastructure. The policy problem this analysis seeks to understand is how states regulate ownership, pricing, and measurement of electricity dispensed from electric vehicle infrastructure and supply equipment. The policy question posed by the client, the South Carolina Energy Office, originated from an email received by the South Carolina Department of Agriculture regarding standards for pricing and measures for the installation and use of an electric vehicle charging station. With South Carolina's regulatory environment for electric vehicle infrastructure still in development, the Energy Office is interested in understanding regulatory trends and methods that other states have adopted and implemented, as well as which state agencies (e.g., the Department of Agriculture) should be involved.

This research uses qualitative policy analysis and interviews to gain insight into the regulatory environment for electric vehicle infrastructure and supply equipment of various states across the U.S. The analysis evaluated four components of regulation: whether states have revised public utility definitions to include clarification about the regulation of electric vehicle supply equipment, which ownership methods have been approved by states' public utilities commissions, which pricing methods are approved or prohibited in various states, and which states have approved an agency to oversee the measurements from devices necessary for electric vehicle charging. An initial analysis of state laws and incentives was completed using data available from the U.S. Department of Energy's Alternative Fuels Data Center. Further analysis was completed by reviewing state laws, codes, statutes, public utility dockets, and electric vehicle programs. Where information was still missing, interviews were conducted with program managers responsible for implementing various aspects of states' electric vehicle programs. The results outline the findings from the research and the recommendations are based on initiatives from various states, as well as suggestions from electric vehicle and electric vehicle supply equipment experts and stakeholders.

The results indicate a variety of trends. Two-thirds of all states have revised public utility definitions to omit electric vehicle supply equipment from the definition of a public utility. The most common ownership methods are to allow full utility ownership of charging stations or to approve only the ownership of make-ready infrastructure and allow third-party ownership of the actual charging stations. Only one state, Ohio, has disapproved utility ownership of any aspect of electric vehicle infrastructure. Most states allow a variety of pricing methods. California is the only state to prohibit time-based pricing, as approved through an amendment to its Electric Vehicle Fueling Systems Specifications established by the Division of Measurement Standards. On the other hand, Wisconsin banned energy-based pricing by non-utility entities under the standard that distributing electricity through a charging station is considered the sale of electricity and only utilities are permitted to sell electricity by the kilowatt-hour. Finally, this

analysis found that very few states have established standards for the measurement of electricity through electric vehicle charging devices.

The recommendations gather a variety of suggestions that South Carolina can adopt to move forward with developing a regulatory system for electric vehicle supply equipment as indicated by electric vehicle market experts and researchers, electric vehicle studies completed by states, and state trends discussed in the results. These include: creating a state-wide vehicle stakeholder group for collaborative efforts in developing the electric vehicle supply equipment market; defining each stakeholder's regulatory authority and role in the electric vehicle supply equipment market (including the South Carolina Public Service Commission establishing parameters for utility involvement and the South Carolina Department of Agriculture establishing measurement standards); revising the public utility definition for greater clarification of how electric vehicle charging station owners should be regulated; and recommending or requiring that Duke Energy and other utilities that wish to invest in electric vehicle supply equipment offer a make-ready approach to ownership to support greater market competition.

With electric vehicle adoption and electric vehicle supply equipment deployment still low in South Carolina, this is a pivotal time for the state to implement proper regulatory methods. Trends can be evaluated across states when it comes to utility involvement in the electric vehicle supply equipment market that South Carolina can learn from and adopt. However, regulation of pricing methods and measurement of electricity dispensed is still a new development for states across the country. South Carolina could be a leading state in this development if decisions are made and action is taken quickly. Further, developing a regulatory system now allows the state to become 'EV ready' and allows for an easier transition to electric vehicles in the future.

Policy Question

What regulatory methods can South Carolina adopt from state trends and approaches for ownership, pricing, and measurement of electricity dispensed for EVSE?

State Energy Offices (SEOs) across the U.S. are responsible for "advancing practical energy policies, informing regulatory processes, and supporting energy technology research, demonstration, and deployment" (NASEO, n.d.). SEOs work with private and public sector stakeholders to achieve state climate goals. As part of this, Southeastern SEOs – those in Kentucky, Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi – formed the Southeast Regional EV Information Exchange and partnered with the Nicholas Institute for Environmental Policy Solutions to provide a coordination touchpoint to share information and best practices for EV adoption within the region. Part of the goal of the Southeast Regional EV Information Exchange is to develop a shared strategy to build a "robust network of charging infrastructure that connects major highway corridors and allows EV drivers to travel easily throughout the region," (Siegel, 2019) which includes understanding best methods for charging infrastructure regulation. Within this, the South Carolina State Energy Office has developed a set of questions to drive the State's or the Southeast Region's regulatory development. These questions include:

1. In what ways do states regulate utility and non-utility investment and ownership of EVSE?
2. Do states approve of or prohibit specific pricing methods to support market competition and maintain fair and affordable options for EV drivers?
3. How do states regulate the measurement of electricity dispensed from EVSE to ensure consumers are receiving the amount of electricity for which they are paying?

Background

The electrification of transportation has become a significant topic amongst state policymakers and legislators within the past few years. In the U.S., electricity currently makes up less than one percent of all energy consumption within the transportation sector while petroleum products account for 91 percent (EIA, 2019). Because of the dependence on high carbon-emitting fuels, the transportation sector contributes to 28 percent of the nation's greenhouse gas (GHG) emissions – the most out of any economic sector, including electricity, industry, commercial, residential, and agriculture (EPA, n.d.). To drive down emissions and reach climate goals, states are developing programs, initiatives, and incentives to diversify the transportation sector's fuel mix and promote the adoption of electric vehicles (EVs) (Hartman and Shields, 2021). Not only is electrifying transportation beneficial for combatting climate change, but it can also help citizens save money with lower vehicle maintenance costs and electricity prices, improve public health by reducing air pollution, allow power grids to make use of renewable energy sources more efficiently, create jobs in response to greater renewable energy development, and reduce dependence on foreign petroleum markets (Kadoch, 2020a).

Despite government incentives to increase adoption of electric vehicles, growth is limited by the supply of sufficient charging infrastructure. Supplying sufficient charging infrastructure is one of the greatest obstacles to statewide EV adoption. This leads experts to predict that the consumer purchase of EVs will outpace the implementation of electric chargers. A 2016 EV consumer survey by McKinsey and Company found that lack of access to efficient charging stations was the third most serious barrier to EV purchases and could quickly become the top barrier as prices decrease and ranges increase (Engel et al., 2018). McKinsey and Company also estimates the demand for charging energy to increase from about 20 billion kilowatt-hours in 2020 to about 280 billion kilowatt-hours in 2030 (Engel et al., 2018).

An increase in demand for EV purchases is expected to be accompanied by an increase in demand for residential, workplace, and public charging stations. According to the U.S. Department of Energy, around 80 percent of EV charging takes place at home (US DOE, n.d.). However, public charging demand is expected to grow dramatically within the next decade as EVs become more widely adopted across different regions and subpopulations of the country. Public charging stations, which typically consist of either Level 2 or DC Fast Charging (DCFC) stations, are stations that are publicly accessible, including those located at shopping centers, airports, hotels, government offices, public parks, public parking lots and garages, businesses, truck stops, gas stations, and along transportation corridors, city curbsides, and right-of-way locations (Smith, 2020a). Level 2 stations offer alternating current (AC) charging through a 240-volt electrical service. These chargers can be installed in homes or for commercial use and provide 10 to 12 miles of range per one hour of charging. DCFC stations use direct current (DC) charging equipment to provide rapid charging of 60 to 90 miles of range per 20 minutes. DCFC is best for rapid charging needs along heavy traffic corridors or other public spaces (AFDC, n.d.-a).

Because the EV market is new and some technologies are still being developed, there remains uncertainty in questions regarding the regulation of EV charging infrastructure and supply equipment (EVSE). Recently, the South Carolina Department of Agriculture was asked by a potential EVSE owner about acceptable pricing methods in compliance with the state's utility definition and rules for weights and measures. The question was forwarded to the South Carolina Energy Office, as the Department of Agriculture does not formally regulate matters related to EVSE and there currently exist no standardized regulatory bodies among states. The purpose of this research is to produce a report that analyzes approaches and trends in the development of a regulatory system for EVSE across states. This is intended to provide South Carolina with recommendations for moving forward in the development of a regulatory system that will foster growth of the electric vehicle market in the state, and potentially for the Southeast Region.

Literature Review

Many analyses have been completed to demonstrate the expected growth in EVs and how states can prepare. One of these analyses includes the *Plug-in Electric Vehicle Market Projections* report by Electric Power Research Institute (EPRI). Drawing on historical sales values and a combination of external forecasts and assumptions, EPRI projected three possible scenarios – Low, Medium, and High market share – for EV market penetration through the year 2050. While the Low and High projections were to be considered "bounding scenarios," the

Medium projection was to be considered the "middle-ground estimate" for national-level EV adoption. EPRI's prediction indicates that the market share of EVs could range anywhere from almost 5 percent in the Low scenario to almost 60 percent in the High scenario, with the middle-ground estimate around 35 percent, by 2050 (Alexander, 2017).

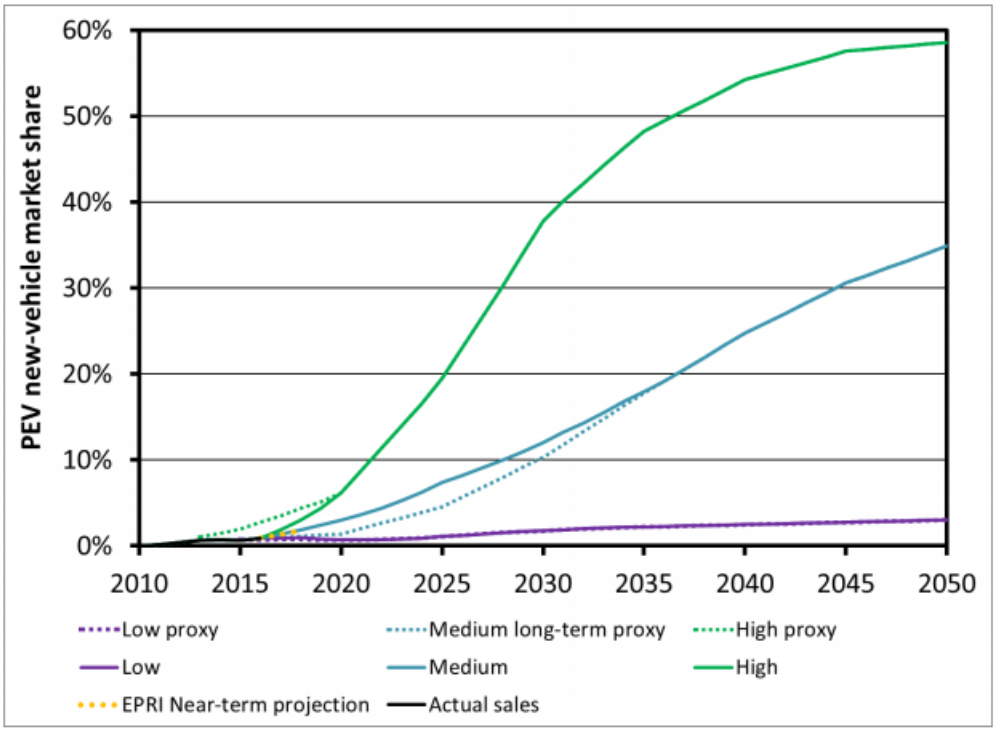

Figure 1. EPRI Low, Medium, and High Plug-in Electric Vehicle market penetration scenarios as predicted annual share of sales (Alexander, 2017).

With 45 states and the District of Columbia providing incentives for EVs, it is evident that many states recognize this potential for significant growth in the EV market and are developing strategies to promote it. However, states vary significantly on the level of action and methods taken.

Total passenger EV sales hit 1.6 million in the U.S. in 2020 (Smith, 2020b) – up from 1.4 million in 2019 and just over 17,000 when all-electric vehicles came into the market in 2011 (US DOE, 2020) – demonstrating that the EV market is growing. California leads the nation in the number of EV incentives (Hartman and Shields, 2021), EV registrations (NREL, 2020), and public charging stations (AFDC, n.d.-b). Eleven other states – Washington, Oregon, Colorado, Maryland, New Jersey, New York, Connecticut, Rhode Island, Massachusetts, Vermont, and Maine – joined California in meeting the state's air quality standards and greenhouse gas reduction goals through the Zero Emission Vehicle (ZEV) program (Smith, 2020b). These states and California make up about 60 percent of all EV sales in the nation. The Southeast – including Alabama, Florida, Georgia, Mississippi, North Carolina, South Carolina, Tennessee, and Kentucky – typically falls behind other regions in the country for EV adoption, infrastructure

deployment, and funding incentives because of a lack of policy support and government funding resources compared to that of the ZEV program states (Smith, 2020b).

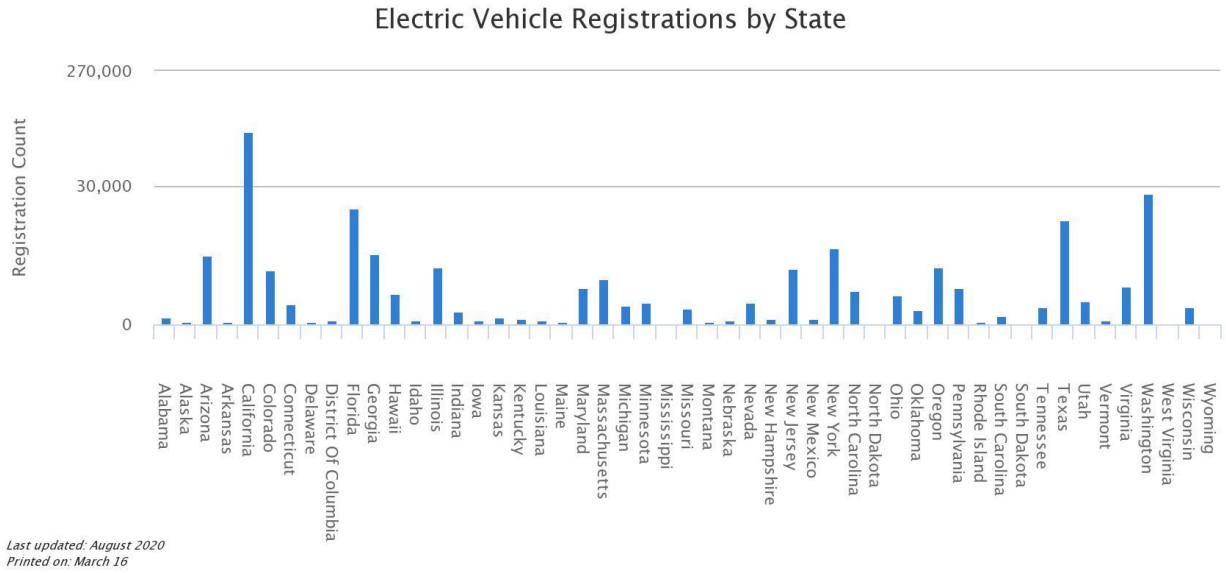

Figure 2. Electric vehicle registration counts by state (NREL, 2020).

While the Southeast currently represents about 10 percent of all passenger EV sales in the nation, these states have started implementing transportation electrification strategies, including plans for EVSE deployment (Smith, 2020b). However, to fully support EV market growth, it is necessary that states resolve the ambiguity around the regulation of charging stations in terms of ownership, pricing methods, and standards for measuring the amount electricity dispensed.

Several studies have outlined steps states can take to clarify the role of regulatory stakeholders for EVSE deployment. The Regulatory Assistance Project (RAP) released a *Roadmap for Electric Transportation* with separate sections, including a policy guide and legislative actions for states to adopt. The report identifies regulatory decisions that can have in impact on EVSE deployment, including (1) a state's utility definition and (2) the level of involvement a utility can have in EVSE ownership and management. (Kadoch, 2020a).

Electricity in the U.S. is regulated as a commodity with jurisdiction over local distribution, transmission, generation, and sales given to individual states, often through a state's public utilities commission (PUC) or equivalent agency. Debate exists around whether electricity provided by EVSE is considered reselling electricity and should be regulated as a utility. If it remains undetermined whether a charging station is defined as a public utility, uncertainty exists around whether stations fall under the regulatory authority of the state's PUC and whether stations should be regulated in the same way public utilities are regulated, even if the station is owned by a non-utility entity (Kadoch, 2020a). While some states have addressed this concern by revising codes and statutes to include language that EVSE are not to be regulated as utilities, other states have yet to make similar action or have struck down legislation to do so.

The main two EVSE ownership models include site host-owned or third party-owned. Site hosts are the purchasers of charging equipment and the owners of the lot or site at which the equipment is installed and maintained. In a site host-owned scenario, the site host (such as a grocery store, gas station, or other businesses) assumes full control over the charging station once installed and is responsible for all costs of installation, operation, and maintenance. Third party-ownership includes full installation, ownership, and maintenance by the charging network that supplies the stations, such as Tesla, ChargePoint, Electrify America, and EVgo (AFDC, n.d.-c). Other models are being developed as the market expands, including those in which multiple parties are involved. For example, one could consist of an owner of the site in which the charging station is installed as well as an entity such as a utility or another company that owns and operates the equipment.

While some states allow utility investment and ownership of EVSE, others have expressed concern in doing so. Experts suggest that both private and public investment will be necessary to see rapid and sufficient deployment needed to support EV adoption. The Rocky Mountain Institute's report *From Gas to Grid* suggests that public investment will be essential to building an initial network of charging stations while private investment is likely to remain low as businesses evaluate the profitability of EV charging (Fitzgerald and Nelder, 2017). RAP lists five possible scenarios for the role of utilities around EVSE (Kadoch, 2020a):

1. **The utility acts as a facilitator**, in which the utility provides nondiscriminatory electric service without direct engagement in the business.
2. **The utility acts as an enabler**, in which the utility installs the infrastructure needed to connect the charging station to the electricity grid but does not install, own, or operate the station.
3. **The utility acts as a manager**, in which the utility delivers electric service to the station and manages the station to ensure efficient grid interoperability.
4. **The utility acts as a provider**, in which the utility delivers electric service to the station, owns the station, provides charging services to consumers, and makes a profit from the station.
5. **The utility as an exclusive provider**, in which only the utility is permitted to sell electricity to the public and takes an all-inclusive manager role of the charging station by restricting non-utility entities from owning and operating stations.

Concerns stem from the fear that supporting utility investment will result in monopolization and run out competition. Scenario 5 in this list is most likely to result in utility monopolization of charging stations as it defines charging station services as the reselling of electricity and prohibits non-utility vendors from actively engaging in the ownership or management of charging stations (Kadoch, 2020a).

Since the EV and EVSE markets are new and still developing, there is no standardized approach that states have taken. California was the first state to consider this and initially prohibited utility investment and ownership in EVSE. The state quickly reversed the decision when private sector investment was not meeting its objectives. Following California's decision, Oregon passed laws ordering utilities to invest in charging stations, allowing them to use

ratepayer money for this investment. Kentucky passed legislation allowing utility investment under the condition that the industry only charge customers for use in efforts to offset construction and maintenance costs without putting the financial burden on non-use customers. States including Missouri, Michigan, and Kansas denied utilities' requests to invest in and own charging stations with customers' money since only a small proportion of the ratepayers will benefit (Moore, 2017). Experts suggest that moving forward, states should encourage regulators, utilities, and charging station providers to work together to achieve the most profitable opportunity without limiting competition in the market (Fitzgerald and Nelder, 2017).

Ambiguity around ownership leads to ambiguity around acceptable pricing methods and rates. With several different investment and ownership options comes different incentives to charge different rates. This means the price an EV driver pays to charge their car can vary depending on whether that driver used a charging station owned by a retail store, a utility, or a charging network company (Thill, 2019). It also varies based on the pricing method used by the station owner. The most common pricing methods include energy-based rates, time-based rates, parking or idling fees, or providing charging for free.

Energy-based pricing is the method used by utilities for electricity consumption. Energy-based pricing considers electricity costs from consumption, capital investment costs, and fixed costs for operation and maintenance of the station (NREL, n.d.). The fee charged to consumers is structured in dollars per kilowatt-hour ($/kWh) or per megajoule ($/MJ) of energy consumed. PUCs often set the rates that utilities can charge for electricity, but there is uncertainty whether PUCs should also regulate the rates for EVSE, even if the station is owned by a non-utility entity. In some cases, states have suggested prohibiting energy-based pricing for non-utility EVSE owners.

Time-based pricing methods are most common in states that prohibit non-utilities from selling electricity (AFDC, n.d.-d) and are also often used under third party-ownership by charging networks, including Electrify America and EVgo, that charge by the minute of use (Morris, 2019). This pricing method has caused controversy as several factors can affect how much a consumer pays with time-based pricing, including a vehicle's maximum charging speed and the weather (Morris, 2019). For example, researchers from the Idaho National Laboratory found charging was roughly three times slower at the coldest temperatures compared to warmer temperatures (Motoaki, Yi, and Salisbury, 2018). Studies have also found that public charging stations that use per-minute rates sometimes result in electricity prices that are three to four times the average cost of electricity for home charging (Benoit, 2019), making public charging a more costly option for consumers than traditional internal combustion engine vehicles.

Some site hosts may implement a standard fee for using the charging station or a parking fee to recover costs and generate revenue, while others will offer free charging to attract consumers to their business, increasing revenue from purchases made while the consumer waits for the vehicle to charge (Smith and Castellano, 2015). Some site hosts also use a combination of methods, such as providing free charging during business hours and charging a fee after business hours (Smith and Castellano, 2015) or setting a rate after the initial hour of use to encourage

drivers to allow others to use the space (Thills, 2019). However, pricing methods for EVSE can depend on a state's laws and incentives, and ambiguity or indecisiveness at the state-level can cause frustration with EV owners, site hosts, and third-party charging networks, leading to less desire to purchase an EV or own a charging station in that region.

Consumers also want to be certain that they are receiving the amount of electricity they are paying for. This is a common problem addressed for the dispensing of traditional motor fuel, such as gasoline and diesel. In most states, the standards for weights and measures of motor fuel falls under the regulatory authority of the state's agriculture department (Ferris and Iaconangelo, 2019). For gas stations, states have standards that require gas stations to be regulated and audited by the regulatory department to ensure consumers are provided the accurate price per gallon before pumping and that they receive the exact amount of fuel for which they are paying (Benoit, 2019). However, similar regulations for EVSE are still being developed and adopted by states.

The U.S. National Institute of Standards and Technology (NIST) published specifications, tolerances, and technical requirements for commercial and data gathering measuring devices through the NIST Handbook 44. This includes a tentative code in Section 3.4 that applies to:

> "…devices, accessories, and systems used for the measurement of electricity dispensed in vehicle fuel applications wherein the quantity determination or statement of measure is used wholly or partially as a basis for sale or upon which a charge for service is based."

The code further states that EVSE used to charge electric vehicles "shall indicate the electrical energy, the unit price, and the total price of each transaction," including the start and stop time of a single transaction, the total quantity of energy delivered, the unit price recorded in either megajoules (MJ) or kilowatt-hours (kWh), and the total price for the quantity of energy delivered (NIST, 2019). While this code is not currently enforced, it is available for states to adopt or amend the language as seen fit and can provide guidance as states are tasked with determining official metrics and standards for a system with very little consistency in pricing methods and ownership models as the market develops (Ferris and Iaconangelo, 2019).

Data Collection Methodology

Because the EV and EVSE markets are still new in the U.S., many states do not have set regulations and standards for charging. Some states that have higher EVSE deployment rates, such as California, have a higher number of regulatory decisions under consideration. Other states, such as Ohio and Colorado, are actively in the planning and deployment stages of EVSE. Some of these states have begun the discussions and implementation of regulatory decisions, including revising the utility definition and determining ownership and pricing methods. Other states, however, are either just beginning to discuss the planning process to deploy and regulate EVSE or have not yet started that discussion as EV adoption rates remain low in the state. To

understand the status of EVSE regulation among states, I analyzed various state public policies, records, and programs and conducted interviews with program managers at the state and national levels.

The Alternative Fuels Data Center (AFDC) provides a dataset of state laws and incentives related to alternative fuels (AFDC, n.d.-e). This dataset was used to determine which states revised utility definitions to include electric vehicle charging infrastructure specifications. Through this dataset, it was determined that 28 states revised codes or statutes to establish that electric supply equipment is not defined as a public utility. For the states that were not included in the dataset for public utility definitions, this information was determined from various other methods. First, a search of the state's online legislation portal was done to verify that the public utility definition had or had not been revised to include the status of electric vehicle supply equipment. If it was determined that a revision was not included, a search of the state's electric vehicle initiatives, programs, and studies was performed to identify the status of EVSE within that state. This analysis of policies and programs was done to identify which of the following situations pertained: the state has recognized the problems that can arise by not refining the public utility definition to include a statement about EVSE and has stated plans to address this in the near-term; the state presented legislation to amend the public utility definition but the legislation was not passed; the state has made no effort to amend the public utility definition and currently defines EVSE as public utilities.

The ownership, pricing method, and measurement compliance laws for states are less defined. This again began with an initial review of state laws and incentives as listed in the AFDC database. For states that did not have laws listed in the database, I completed a similar search through the states' online legislature and public record portals to search for policies and programs that address these regulatory concerns. I also utilized records from state PUCs, Energy Offices, and relevant departments to understand what role utilities and other state entities are currently playing, if any, in the investment, ownership, and approved pricing methods of EVSE.

Further, I conducted interviews over Zoom and email to gather a more in-depth analysis of regulatory decisions where public records did not meet my research criteria. However, only a few responses to the interviews were received, limiting the amount of data I have collected for various states. This is most likely due to a variety of reasons in response to the COVID-19 pandemic, including: the increased workload that has come from transitioning to working from home has made it more difficult to respond to non-essential emails in a timely manner; or the possibility that a contact was furloughed or temporarily laid off because of economic shutdowns and budget shortfalls as a result of the pandemic.

The interviews included those with a program officer for the National Association of Regulatory Utility Commissioners (NARUC) and two program managers for the National Association of State Energy Officials (NASEO) to identify key states to consider for the various regulatory aspects of the analysis. I then conducted interviews for various state-level programs and departments focusing on EVSE deployment, including the Nevada Office of Energy, the

Colorado Energy Office, the New Jersey Department of Environmental Protection, Virginia Clean Cities, Renew Wisconsin, and the DriveOhio program. The interview questions included some variation of the following:

1. Does the state consider the use of EV charging stations as the reselling of electricity, and as such are EV charging stations regulated as utilities?
2. Is there a state-level regulatory body for EV charging stations that are not owned by a utility or does this fall under the authority of the PUC?
3. Does the state specify types of pricing methods that can be used for charging stations? For example, since utilities use energy-based pricing ($/kWh), would a charging station owned by a non-utility entity be required to use a different pricing method? Or is there no regulation regarding the types of pricing methods that can be used?
4. If the state does specify pricing methods, is this established by the PUC or a different state department?
5. Who oversees inspections to ensure that charging stations are dispensing the quantity of electricity that the customer is paying for? (Similar to how Weights and Measures inspect the quantity and quality of traditional motor fuel.)
6. Does the state currently follow NIST Handbook 44 for measurement compliance standards?

Results

Utility Definition

In January 2020, the South Carolina legislature introduced Senate Bill 922 to amend the South Carolina Code of Laws to include language stating:

> "(A) A person or corporation who uses an electric vehicle charging station to resell electricity to the public for compensation is not an electric utility if:
>
> (1) the person or corporation has procured the electricity from an electrical utility, municipality, consolidated political subdivision, or an electric cooperative that is authorized to engage in the retail sale of electricity within the territory in which the electric vehicle charging service is provided;
>
> (2) the person or corporation furnishes electricity exclusively for the charging of plug-in electric vehicles; and
>
> (3) the charging station is immobile.
>
> (B) Nothing in this section shall be construed to limit the ability of an electrical utility, municipality, consolidated political subdivision, or an electric cooperative to use electric vehicle charging stations to furnish electricity for charging electric vehicles. Any increases in customer demand or energy consumption associated with transportation electrification shall not constitute found revenues for an electrical utility (S.C., 2020)."

The bill died in committee and the current status of EVSE in South Carolina exists that a person or corporation providing electricity to the public for compensation, including owners of EVSE, is a public utility.

South Carolina remains in the minority of states that have not passed legislation to revise the public utility definition to omit EVSE owners from utility regulation. The additional 9 states include Indiana, Louisiana, Michigan, Mississippi, Nebraska, South Dakota, Tennessee, Wisconsin, and Wyoming. However, it is unclear at this time whether some of these states had situations like that of South Carolina where legislation was introduced but failed to pass. It is also unclear whether these states are currently planning to take measures to revise the public utility definition. While some states, including Tennessee and Michigan, have developed EVSE deployment programs in partnership with public utilities, there is no indication as to the expected status of EVSE following implementation of these programs. Therefore, these states are categorized as such.

Alternatively, 36 out of the 50 states and the District of Columbia have revised codes and statutes indicating that EVSE owners are not public utilities. Four states – Arizona, Kansas, North Dakota, and Georgia – were categorized as having an 'undefined' status regarding deregulating EVSE as public utilities. These states have addressed the necessity of properly defining EVSE and have indicated plans to do so in the near-term. These plans were indicated as follows:

Arizona: the Arizona Corporation Commission (ACC) released an EV Policy Statement discussing the state's approach to policy for EVs, EVSE, and the Electrification of the Transportation Sector. Section 3 of the statement, entitled "The Role of the Commission Over Providers of Electric Charging Stations," refers to Article XV, § 2 in the Arizona Constitution that defines a Public Service Corporation as "all corporations other than municipal engaged in furnishing gas, oil, or electricity for light, fuel or power (ACC, 2018)." Although the ACC stated the issue will not be addressed at this time, it indicated plans to do so (ACC, 2018).

Kansas: the Kansas Corporation Commission (KCC) released its *Study of Consequential Issues Materially Affecting Kansas Electricity Rates* (2020) in response to Senate Bill 69, calling for a study of retail electricity rates of Kansas electric public utilities. Section 3 of the study, entitled "Potential Effects of Deregulating Electric Vehicle Charging Stations," discusses the consideration of including the deregulation of EV charging services in future legislation after House Bill 2585 was amended to no longer include similar provisions. The study included utility and stakeholder perceptions on the issue, expressing support for deregulation to eliminate cross-subsidies and reduce charging costs. The study also noted that the deregulation of compressed natural gas for vehicle fuel could be used as a precedent for deregulating EV charging stations. However, the state has not yet taken action to do so (AECOM, 2020).

North Dakota: the North Dakota legislature introduced Senate Bill 2091 (2021) which includes language "exempting owners of Electric Vehicle (EV) charging stations from the definition of public utility (IOU) and cooperative utility, provided the EV charging stations purchases all of its electric needs from the incumbent utility in the service territory (N.D., 2021)." The Bill was introduced on January 5, 2021,

passed in the Senate, and was referred to the House Energy and Natural Resources Committee. As of March 9, 2021, the Committee recommends passing the Bill (N.D., 2021).

Georgia: the Georgia legislature introduced House Bill 776 (2021) which includes language stating that the authority and jurisdiction of the Georgia Public Service Commission "shall not extend to a person or entity not otherwise subject to the authority and jurisdiction of the commission that is engaged in the retail sale, as such term is defined in Code Section 48-8-2, of electricity to the public for the sole purpose of charging the batteries of electric vehicles (Ga., 2021)." The Bill was introduced on March 17, 2021 and is currently sitting in the House Ways and Means Committee. If passed, it would establish that electric vehicle charging station owners that are not already considered to be public utilities are not subject to regulation as a public utility under the Georgia PSC (Ga., 2021).

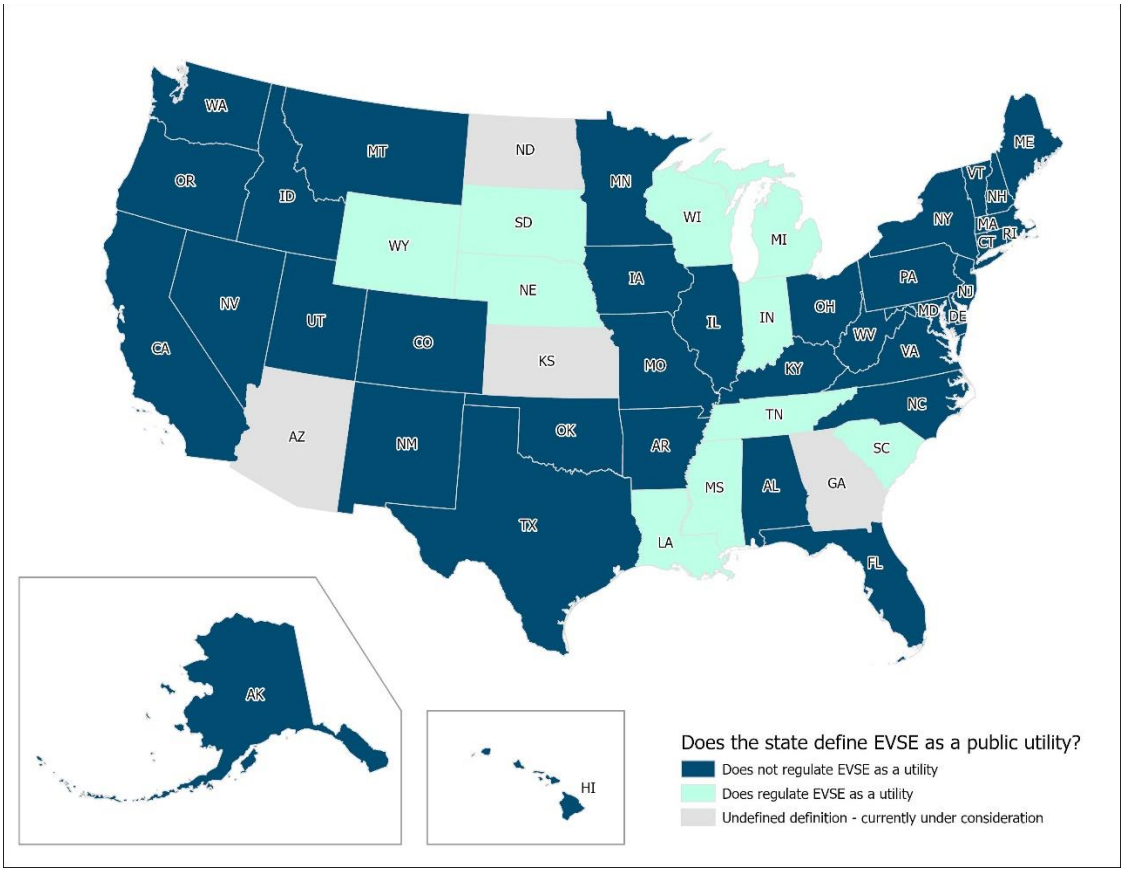

Figure 3. Map of public utility definition revisions across states.

Investment and Ownership

There are several ownership models that vary by degree of utility involvement and are currently handled on a state-by-state level. In most states, utilities act as providers of EVSE, where electric companies are allowed full ownership of EV infrastructure and charging stations. Becoming increasingly popular, however, is the utility as an enabler, in which the utility is not

permitted to own charging stations, but rather can invest in and install infrastructure up to the point of connection to the charging stations. This is often referred to as 'make ready' infrastructure. Another option that has been implemented is restricting utility ownership altogether. This method allows the utility to act as a facilitator by only permitting the company to provide nondiscriminatory electric services, to act as an intermediary between station owners and other stakeholders on matters of electricity management, or to provide incentives for EVSE deployment.

In 2018, Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) requested approval of an Electric Transportation Pilot program from the South Carolina Public Service Commission (PSC). The original pilot request included a public DC Fast Charging Station Program in which the companies would invest in and own 20 DCFC stations across various locations throughout the DEC service territory and 10 DCFC stations through the DEP service territory. The company assured it would establish a "clear and stable price signal to consumers while also encouraging further market growth from other third-party operators (P.S.C. of South Carolina, 2018a)." After opening the request to public comments, the PSC allowed for a modification of the pilot to double the number of charging stations in each service territory per stakeholder request. One stakeholder, Charge Point, expressed opposition to increasing the number of charging stations, suggesting the expansion could interfere with "market dynamics." However, DEC and DEP stated the expansion would enable greater cross-state EV travel and improve market penetration of DCFC (P.S.C. of South Carolina, 2018b). The DC Fast Charging Station Program of the pilot was approved by the PSC in September 2020 (P.S.C. of South Carolina, 2020).

The following are additional examples of ownership models in states with significant investment in EV and EVSE programs:

I. States that allow utility ownership of EVSE

a. North Carolina:

In 2019, Duke Energy Carolinas (DEC) and Duke Energy Progress (DEP) applied for approval of an Electric Transportation Pilot program (ET Pilot) to study potential best practices for increasing electric transportation adoption in North Carolina (NCUC, 2020). The initial pilot request included a Residential EV Charging Program, a Fleet EV Charging Program, a School Bus EV Charging Program, a Multifamily Dwelling Charging Station Program, a Public Level 2 Charging Station Program, and a DC Fast Charging Station Program. These programs were intended to support the installation of public and private EVSE and understand charging behavior. Through the ET Pilot, DEC and DEP would install, own, and operate all charging stations and recover costs through respective base rates (NCUC, 2020).

Comments on the proposal from public staff and organizations expressed concern over aspects of the program, including: concern that the program acts as a capital project rather than a learning opportunity; concern that the program could lead to

monopolization of the EVSE market; and disagreement that the company would be able to recover costs through base rates while EVSE competitors must rely solely on EV customers for cost recovery (NCUC, 2020). Some suggestions for revisions of the ET Pilot included adding provisions that protect customers from higher rates due to dramatic and unexpected higher electricity demand, requirements that the company report prices charged to EV drivers at public stations, allow site hosts to own and operate charging stations, or consideration of alternative utility investment models such as a rebate program or a make-ready program (NCUC, 2020).

The North Carolina Utilities Commission (NCUC) approved a scaled-back version of the program in 2020. The scale-back consisted of limited versions of the Multifamily Dwelling Charging Program, the DC Fast Charging Program, and the EV School Bus Charging Program, while approving the original Public Level 2 Charging Program. NCUC addressed the approval of the Public Level 2 Charging Program as a need for access to reliable public charging stations that the private market alone cannot provide and to promote greater EV adoption. NCUC noted the same reasons for permitting Duke Energy to install DCFC stations, although the Commission reduced the program from 70 stations to 24 in response to opposition concerning the need for greater market competition. Further, upon approval of the ET Pilot, NCUC required that Duke Energy implement experimental rate designs, including tracking and measuring customer responses to rates, and suggested that Duke Energy create a second pilot program to explore additional ownership models (NCUC, 2020).

b. Nevada:

In 2016, the Governor of Nevada released the state's Strategic Planning Framework to include completion of the Nevada Electric Highway by 2020. In 2017, the Nevada legislature passed Senate Bill 145 to include the creation of the Electric Vehicle Infrastructure Demonstration Program ("EV Program") to promote investment in public EVSE, incentivize EV adoption, and reduce range anxiety (Nev., 2017). The EV Program was developed to allow for collaboration between NV Energy, one of Nevada's major public utilities that transmits and distributes electric service in northern and southern Nevada, and other stakeholders to complete the Nevada Electric Highway. In 2018, the Nevada PUC issued a docket requiring NV Energy to set aside $15 million in existing funds to help complete the highway in response to the EV Program and as part of a larger effort to modernize the grid (P.U.C of Nevada, 2018). This docket allowed the utility to build, own, and operate charging stations, subject to approval of installation and rates by the Nevada PUC. Non-utility entities could also apply to be site hosts, with stipulations including that the infrastructure be located within NV Energy's service territory and connected to NV Energy's grid. All stations owned and operated by a non-utility entity are not subject to regulation by the PUC (P.U.C of Nevada, 2018).

While state regulators and clean energy advocates approved of the state's plans, ratepayers expressed concern over the utility funding the project and other future EVSE investments through increased rates (Rothberg, 2018). The content of the legislation remains vague about the potential to allow NV Energy to recover costs through ratepayers. Though NV Energy stated plans to use funding that is already set aside, the legislation included a section stating the utility may recover costs through customer incentives associated with the program as subject to approval of the Commission (P.U.C. of Nevada, 2018). However, despite the ruling, the utility currently does not own or operate any public charging stations (Brady, 2021). In the case of non-utility ownership, a rate must be set by the utility as reviewed by the Commission based on the time of day, day of the week, or time of the year during which the electricity is used (P.U.C. of Nevada, 2018).

II. States that disallow utility ownership of EVSE

a. Ohio:

In 2018, American Electric Power (AEP Ohio) requested from the Public Utilities Commission of Ohio (PUCO) approval to implement an electric security plan which included the ability to recover costs associated with EV charging stations. In response, PUCO approved a rebate program for the utility company in which AEP Ohio could provide rebates for hardware, network services, and installation of Level 2 and DCFC stations. The rebates cover 50 to 100 percent of installation costs for public- and private-owned charging stations. Other stipulations include AEP Ohio determining criteria related to construction, location, and the design and type of charging stations that qualify subject to the best available technology (P.U.C. of Ohio, 2018).

Through the rebate program, PUCO concluded that AEP Ohio would not own any of the charging stations and would not receive a return or profit on the stations. Rather, the company could collect an administration fee of five percent to be applied to the total cost of the rebates. Any change in customer rates includes an estimated monthly increase of $0.50 for residential customers using 1,000 kWh per month to offset costs of the EV program along with other programs (P.U.C. of Ohio, 2018). This is above the average household electricity usage of about 870 kWh per month (EIA, 2020). AEP Ohio also guaranteed financial assistance to low-income residential customers in attempts to ensure the program benefits and balances the interests of all ratepayers and the public interest (P.U.C. of Ohio, 2018).

III. States that allow a "make-ready" approach

a. Massachusetts:

In 2017, Eversource Energy, New England's largest energy provider, submitted a request to the Massachusetts Department of Public Utilities for approval of an EV infrastructure program. The program request included investment in make-ready EV charging infrastructure to connect to Level 2 and DCFC stations at public, workplace, and multi-unit dwelling sites throughout the company's service territories. The make-ready infrastructure included distribution service, transformers, service meters and panels, and associated conduit and conductors needed to connect the equipment (D.P.U., 2017). The request did not include an investment in actual EV chargers. The intention of the program was to help offset costs for the construction of EV charging sites, which is often more costly and technically challenging than installing the actual chargers (D.P.U., 2017). Eversource also committed to recruiting and educating site hosts for the program. Through this program, Eversource Energy chose not to participate in the EV charger market, but rather decided to allow site hosts to choose their preferred EV charger vendor (D.P.U., 2017). The Massachusetts Department of Public Utilities (DPU) approved the company's request, stating that the program encouraged the purchase of EVs, helped to meet the state's climate goals, and would improve grid efficiency, while also encouraging a competitive market for EVSE and lowering investment barriers to EVSE ownership (D.P.U., 2021).

IV. States that allow a mixed approach.

a. Virginia

In 2019, Virginia Electric and Power Company, or Dominion Energy, filed for approval of its Electric Distribution Grid Transformation Plan which included a Smart Charging Pilot program (Virginia S.C.C., 2020). The pilot program instituted a rebate for make-ready infrastructure and upgrades as well as for smart charging equipment (Virginia S.C.C., 2020) that facilitates communication and data exchange between charging stations, site hosts, and the utility company (Dominion Energy, n.d.). The proposal was intended to offset costs of purchasing and installing EVSE, although site hosts are responsible for any continued operation and maintenance and associated costs after installation (Dominion Energy, n.d.). The Virginia State Corporate Commission (SCC) also approved Dominion Energy to install and own up to four charging stations across the state solely for the purpose of collecting data throughout the lifetime of the program. However, the SCC stated that the approval "does not represent any guarantee that additional utility ownership of charging stations will be approved" upon completion of the pilot (Virginia, S.C.C., 2020).

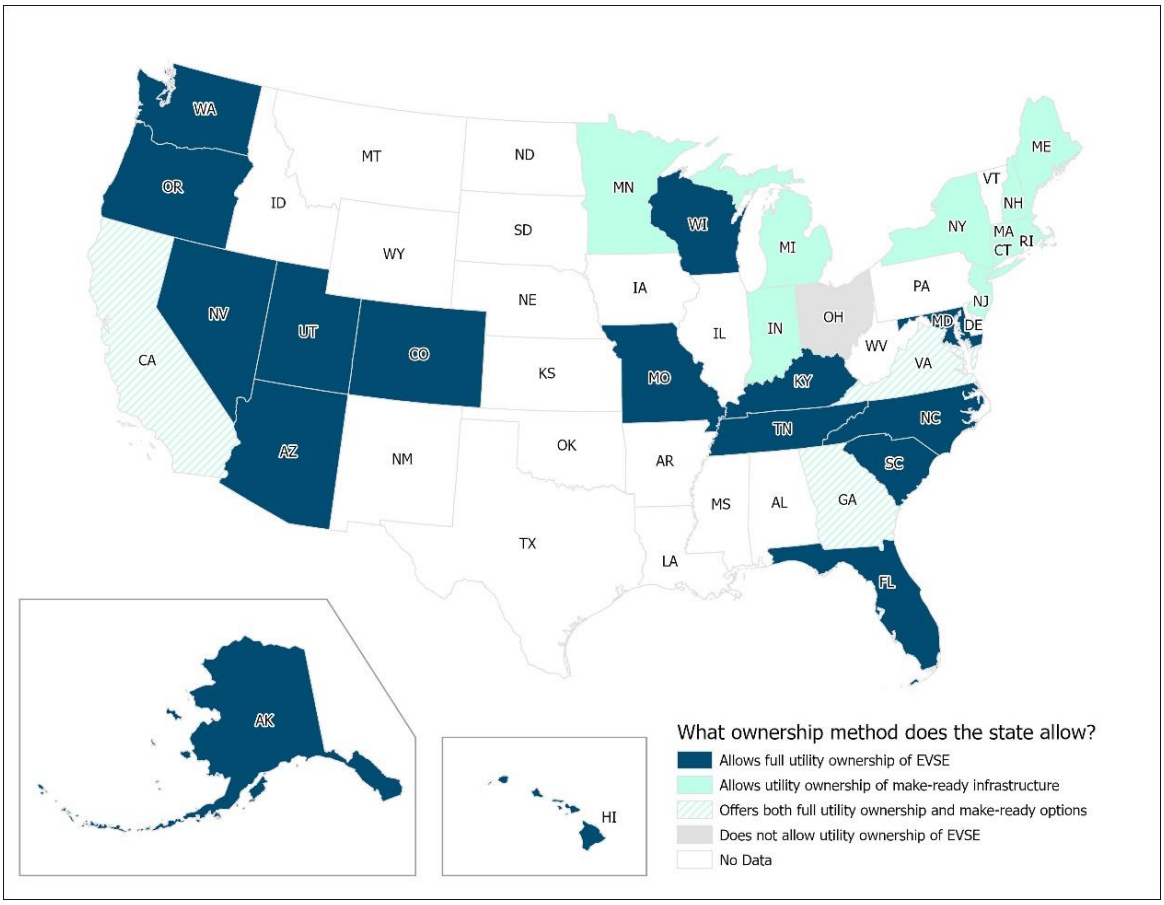

Figure 4. Map of approved ownership methods across states.

Pricing

As mentioned previously, South Carolina law considers people and corporations providing electricity to the public for compensation as utilities. If Senate Bill 922 would have passed through the South Carolina legislature allowing EVSE hosts to resell electricity without being deemed as an electric utility, it would have allowed for the sale of electricity through charging stations by the kWh. While South Carolina allows charging stations owned and operated by Duke Energy to sell by the kWh, it is unclear whether the same holds true for EVSE owners that are not a utility but must be regulated as such under South Carolina law.

The state of Wisconsin similarly deems the ownership and operation of EVSE as the resale of electricity and as such considers all EVSE hosts to be electric utilities. Wisconsin law also states that EVSE hosts cannot financially charge someone for the kWh of electricity, but rather must charge consumers by the minute plugged in (McCurry, 2021). The approved pricing method by Wisconsin is in line with common pricing methods from several major charging networks. Electrify America, EVgo, and Charge Point currently bill by the minute at various charging stations for which the company's own but is often subject to change by station type and location. For example, Electrify America stations consist of Level 2 charging that costs $0.03 per

minute, while DCFC prices range from $0.12 per minute of use for 90 kW chargers and up to $0.32 per minutes of use for 350 kW chargers (Electrify America, n.d.).

On the other hand, California recently adopted legislation prohibiting charging by the minute of use. The California Office of Administrative Law approved amendments to its Electric Vehicle Fueling Systems Specifications which states that all Level 2 chargers must be converted from time-based pricing to energy-based pricing by 2031 and DC Fast chargers by 2033. Additionally, all Level 2 chargers installed in 2021 and later and all DC Fast chargers installed in 2023 or later are prohibited from using time-based pricing. This decision was made by California's Division of Measurement Standards (DMS), acknowledging that electricity sold by EVSE is considered a motor fuel and in accordance with NIST Handbook 44, must be measured by either the kWh or MJ (California Office of Administrative Law, 2019).

In most other states there is no regulation on pricing methods. For example, Virginia allows all types of pricing methods, including time-based and energy-based pricing. The state confirmed that individuals, governments, schools, and corporations can price by the kWh and not be considered a utility if they are purchasing power from an electric utility and selling that power for transportation purposes (Harned, 2021). The New Jersey Department of Environmental Protection and the Nevada Office of Energy confirmed that EVSE site hosts can adopt time- or energy-based pricing, charge a fixed fee, or provide charging for free (Hanna, 2021) (Brady, 2021). The Colorado Energy Office (CEO) also confirmed the state's flexibility in pricing methods, stating various approaches of time-based and energy-based are used. CEO also noted the department will be working with utilities to host a rate design workshop later this year to discuss fair and reasonable rates with PUC oversight (Owens, 2021).

The other question regarding pricing is if a state PUC has authority over setting charging rates whether the station is owned by a utility or not. Again, this varies across states as PUC's have taken various stances on the issue. Ohio is an interesting case in that the PUCO did not approve AEP Ohio to invest in and own EVSE, but the Commission still has regulatory authority over prices charged to EV drivers. The decision concluded that the site host or charging station provider, which in this case would be a non-utility entity, has flexibility in setting prices. However, AEP Ohio, which provides the electricity services to the station provider, is required to report the prices to the PUCO and is subject to Commission authority (P.U.C. of Ohio, 2018). Essentially, this establishes that the PUCO has regulatory authority over pricing despite stations being owned and operated by non-utility entities.

Alternatively, the Missouri Public Service Commission has debated its regulatory authority over EVSE since Ameren Missouri and Kansas City Power & Light (KCP&L), two of the state's major electric utility corporations, requested approval of investment and ownership of charging stations throughout the state in 2017 and 2018, respectively. The Missouri PSC held the view that public EVSE are not within its jurisdiction as charging stations "are not used for furnishing electricity for light, heat or power" and "do not qualify as an electric plant under state law" (Matyi, 2017). Though the PSC has approved of agreements allowing the public utilities to

invest in and own EVSE as pilot programs, it will determine the regulatory framework related to ratemaking and charging prices at the conclusion of each program (Missouri P.S.C., 2017).

Measurements

The South Carolina Department of Agriculture, Division of Consumer Services oversees the Weights and Measures of products and devices such as gasoline dispensers, fuel oil meters, and liquefied petroleum gas meters (SCDA, n.d.). Under South Carolina Code of Laws, the terms weights or measures refer to "all weights and measures of every kind, instruments, and devices for weighing and measuring and an appliance and accessories associated with the instruments and devices." Section 39-9-60 of South Carolina Code of Law outlines "specifications, tolerances, and other technical requirements for commercial, law enforcement, data gathering, and other weighing and measuring devices." This section indicates that the weights and measures standards adopted by South Carolina are based on the standards published by the NIST Handbook 44 (S.C. Code of Laws, n.d.). This implies that, per South Carolina Code of Law, the tentative code for EVSE is informally adopted until otherwise rejected by regulation.

The only state to formally adopt standards outlined in the NIST Handbook 44 is California. In 2019, the California Department of Food and Agriculture, Division of Measurement Standards (DMS) passed an administrative law to Title 4 of the California Code of Regulations, section 11349.3 of the Government Code, requiring commercial weighing and measuring devices, including EVSE, to conform to the NIST Handbook 44 and other additional requirements. The legislation is to be enforced for all public Level 2 and DCFC stations and requires that all stations receive a safety certification by a nationally recognized testing laboratory. Each station must also indicate through appropriate display and markings: the unit price in cents per kWh or MJ, the maximum rate of energy transfer (displayed in kW), the type of current offered (displayed as AC or DC), and the quantity of electricity delivered. Further, the legislation includes that EVSE must be accurate and correct within an acceptable temperature range (California Office of Administrative Law, 2019). The legislation went into effect on April 1, 2020 and allows already installed stations to adopt the requirements by 2031 for Level 2 and 2033 for DCFC stations.

Iowa, on the other hand, has not formally adopted the NIST Handbook 44 tentative code for EVSE but has established the Weights and Measures Bureau within the Department of Agriculture and Land Stewardship to oversee the measurement of electricity as motor fuel. The Iowa Energy Office published a report entitled *Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Support* (2019) in which it addressed the regulatory role of the Weights and Measures Bureau as "implementing national standards as developed through the National Institute of Standards and Technology (NIST)" as well as any necessary changes to Iowa administrative code and law "needed to provide regulatory authority" for EV stations (Iowa Energy Office, 2019).

Other states that have indicated which department oversees the measurement of electricity as a motor fuel include Virginia through the Virginia Department of Agriculture and Consumer Services, Office of Weights and Measures (Harned, 2021); New Jersey through the Division of Consumer Affairs, Office of Weights and Measures (Hanna, 2021); and Colorado through the Colorado Division of Oil and Public Safety (Owens, 2021). In Wisconsin, the Department of Agriculture and the Department of Transportation have been involved in conversations about weights and measures, but the state has not indicated which department will oversee the regulation of EVSE (McCurry, 2021).

Discussion

These findings show various indications for the state-level regulation of EVSE. For one, a majority of states in the U.S. have decided to revise codes and statutes to affirm that the ownership of EVSE is not considered the resale of electricity and should not be regulated as a public utility. However, there are a handful of states that have decided EVSE use will constitute the resale of electricity and be subject to regulation as a public utility or have not yet taken action to consider the issue.

Second, the two main types of utility involvement include: direct utility ownership of charging stations where the utility acts as the manager or provider; or a make-ready infrastructure approach where the utility acts as the enabler. A third, less popular ownership approach is Ohio's approach of prohibiting direct engagement from utilities in the business aspect of EV charging. Rather, the utility acts as a facilitator by providing nondiscriminatory electric services and engaging in aspects unrelated to ownership of EVSE. Though not every state is represented when evaluating utility ownership methods, this report gives an overview of trends in states that have significant planning and development of EVSE programs.

Research for pricing methods was slightly more difficult as many states have not yet defined this aspect of regulation. Therefore, there is a significantly lower number of state policies represented for this issues. However, from the research, it can be concluded that most states do not require EV charging stations to use specific pricing methods. In states that do prohibit certain pricing methods, it is often a ban on energy-based pricing for EVSE owned by a non-utility in states that require non-utility owners to be regulated as a public utility. California is the only state that prohibits time-based charging.

Rate setting is another aspect of pricing that should have regulatory oversight. For EVSE owned by utilities, the PUCs often approve rates. However, many states do not yet have a designated regulatory body over non-utility owned EVSE, and therefore, it is sometimes seen that third-party owners charge rates significantly higher than that of residential rates or the price paid for traditional fuels, such as gasoline. Therefore, it is essential that states define the how EVSE should be regulated and the agencies that will be in charge of doing so in the near-term.

Finally, there is very little regulation regarding methods for the measurement of electricity provided by charging stations. While some states have indicated the temporary adoption or acknowledgement of Section 3.4 of NIST Handbook 44 on EVSE devices,

interviews showed that other states were unaware of the code or chose not to acknowledge it. Further, some states indicated discussions were taking place to consider this aspect of regulation, while others simply stated there was no regulatory authority for the measurement of EVSE devices at this time. This is another issue that would benefit from a defined regulatory foundation and states that develop one could provide a model for other states moving forward.

Recommendations

Results from the state-level policy analysis conclude that there are varying degrees of regulatory engagement for EVSE deployment. Some states have extensive legislation on the matter while others are just beginning discussions on barriers to EV adoption within their states. Compared to other states across the country, South Carolina currently has a low number of electric vehicle charging stations throughout the state and sits at #32 out of 50 states in the number of public charging stations deployed (AFDC, n.d.-b). With a total of 695 public stations, the state falls significantly behind nearby Southeastern states, with North Carolina at 2,018 stations, Tennessee at 1,310 stations, Georgia at 3,518 stations, and Florida at 5,115 stations (AFDC, n.d.-b). Despite the low number of charging stations, South Carolina's EV population is growing. The number of EV registrations in the state grew 25% from 2016 to 2017 and 50% in 2018 (SC Energy Office, n.d.). To support growth of the EV market in the state, South Carolina must take legislative and regulatory actions to ensure proper EVSE deployment. To help South Carolina encourage growth in both EV adoption and EVSE deployment, the following recommendations should be considered:

1. **Create a state-wide stakeholder engagement group.**

   Several reports focusing on EVSE deployment suggest creating a stakeholder group to develop a plan establishing goals and strategies for EVSE deployment within the state (Kadoch, 2020b) (AEE, 2018). This should be a partnership between relevant state agencies, including the South Carolina State Energy Office (SEO), Department of Agriculture (DOA), Department of Transportation (DOT), Department of Commerce, and Public Service Commission (PSC), as well as public utilities companies, charging companies, and other relevant consumer groups and environmental organizations. As indicated in the *Legislative Options* guide by RAP, this will allow for collaboration on a variety of issues, including (Kadoch, 2020b):

   - the quantity and type of EVSE that should be installed across the state to meet demand, reduce range anxiety, and reach all socioeconomic demographics,
   - strategies for long-term incorporation and maintenance of stations throughout the state,
   - approaches to monitoring and data collection on EVSE use and utility distribution system impacts,

- and policy recommendations that benefit utilities, businesses, and consumers.

The Palmetto Clean Fuels Coalition (PCF) released the *South Carolina Electric Vehicle Market Study* (2017) that indicates a variety of stakeholders already involved in the state's EV and EVSE framework, including the SC Department of Administration, the SC Department of Health and Environmental Control, and the SC DOT. While the study highlights an infrastructure implementation location plan, it does not consider several of the other regulatory issues addressed in this report. Therefore, it is recommended that greater analysis of the regulatory environment be considered with participation and collaboration from agencies and on the issues indicated above.

2. Define each stakeholder's regulatory authority and role in the EVSE market.

Ambiguity within states around which state agency has regulatory authority concerning varying aspects of EV and EVSE planning causes delays in adoption and deployment of EVSE. These delays result from lack of clarity over the stipulations of utility and non-utility investment and ownership of charging stations, uncertainty about appropriate pricing rates and cost recovery methods, and a general underdevelopment of policies to encourage EVSE planning and investment. It is evident through the policy analysis that states are beginning to address these considerations, although slowly. To keep up with a growing demand for EVs, South Carolina should establish which state agencies have regulatory authority over EVSE quickly and efficiently. Some considerations include:

- Both utilities and third parties, such as charging networks and public sector entities, should play a role in developing, owning, and operating EVSE.
- PSC should play a role in deciding the level of utility involvement.
- PSC should have authority in developing appropriate pricing rates and cost recovery methods, especially for utility ownership.
- DOA should have authority in determining specifications for measurements of EVSE devices, including deciding appropriate units for fuel dispersion, that can be based on the original or revised NIST standards.
- All other stakeholders (including but not limited to the South Carolina DOA, DOT, SEO, PSC, and other relevant agencies or organizations) should play a role in determining the most beneficial siting locations for public charging stations, including along main transportation corridors and in underserved or low-income communities.

Utility investment and ownership will be the quickest and most efficient method for establishing the EVSE market where private investment lags (Fitzgerald and

Nelder, 2017). Utilities can also act to provide services necessary to expand the market and reduce market failure in the long-term (AEE, 2018). However, third-party investment is necessary to limiting utility monopolization by maintaining a competitive market and supporting innovation of new and more efficient technology and business model design (Fitzgerald and Nelder, 2017).

Studies from other states indicate that PSCs, DOAs, and other relevant stakeholders should take a collaborative approach, through the stakeholder engagement group, to determine the most appropriate roles for all aspects of EVSE deployment and regulation. The PSC of Wisconsin ordered an "Investigation of Electric Vehicle Policy and Regulation" which determined that defining PSC expectations on rate design and utility involvement were key strategies to improve EVSE deployment (P.S.C. of Wisconsin, 2020). The Iowa Economic Development Authority indicated the significance of a PUC's role in aspects related to the regulation of electricity while noting that the DOA should maintain a role over aspects related to the regulation of motor fuel (Iowa Energy Office, 2019).

3. **Revise the public utility definition.**

   In the case of EVSE, electricity being dispensed should be regulated as motor fuel rather than the resale of electricity. Companies should be permitted to operate EVSE without it being considered the resale of electricity. It is clear that this is the overarching trend among states, as two-thirds of all states (including the District of Columbia) have adopted legislation indicating that EVSE use does not constitute the resale of electricity. To maintain consistency across states, especially among neighboring states, South Carolina should reconsider revising its public utility definition to indicate that EVSE owned by non-utility entities are not considered to be public utilities.

4. **Consider the recommendation or requirement of a make-ready investment option for utilities in the state.**

   Though many stakeholders, including EV experts and charging networks, have brought up the concerns related to allowing full utility ownership of EVSE, it is clear that the majority of states have approved various programs to do so. Only a handful of states have disallowed utility ownership altogether or have opted for the make-ready investment option. In the case that utility involvement is approved, make-ready programs have gained significant support from major stakeholders in EVSE development, such as Charge Point. The charging network identified make-ready programs as "one of the most efficient and effective ways for utilities to support transportation electrification market," as make-ready investment encourages the ability to extend the value of ratepayer dollars while

supporting growth of a competitive EV and EVSE market (New Hampshire P.U.C., 2019). With the EVSE market in South Carolina still in early development stages and data collection beginning through Duke Energy's pilot programs, this is a vital time for the state to study the cost effectiveness and efficiency of various ownership methods. Nearby states like Virginia (Virginia S.C.C., 2020) and Georgia (City of Savannah, 2021) are already beginning to pilot similar programs that study the benefits of full utility ownership and make-ready infrastructure methods. By approving of various levels of utility involvement, this can help the state understand which method is best for the growing market and most efficiently meets the needs of the EV driver population.

Conclusion

There are several key takeaways from this data collection. One is that the EVSE market is still incredibly new and developing and that states are moving at different paces in EV adoption and EVSE deployment. This study would benefit from a deeper analysis of each state's political climate as well as other factors that could be speeding up or slowing down adoption of EV and EVSE programs and policies. It would also be beneficial to understand how states are prioritizing electrified transportation initiatives to others. Further, encouraging greater EVSE deployment will require states to properly define the role of all stakeholders, including all potential regulators and owners. However, because the EVSE market is unlike any other, this may involve adapting and revising policies as the market grows. Future analyses would benefit from evaluating how the regulatory environment in a greater number of states with varying political and economic climates develops and changes over time with a maturing market. As for South Carolina, learning from current state trends and developing additional regulatory methods before EVs take up a significant portion of the vehicle share could prove beneficial in establishing the state as 'EV ready.' Reducing ambiguity around various aspects of the market in this sense will support both EV adoption and EVSE deployment to allow for an easier transition from traditional motor vehicles and fuels.

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