



# SC Electric Vehicle Stakeholder Initiative

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South Carolina Office of Regulatory Staff

**Energy Office**

**2022**





# South Carolina Electric Vehicle Stakeholder Initiative Report

## Executive Summary

The Report summarizes the collaborative work of over 350 diverse stakeholders during the South Carolina Electric Vehicle Stakeholder Initiative conducted by the Energy Office of the SC Office of Regulatory Staff (Energy Office). The South Carolina Electric Vehicle Stakeholder Initiative (EV Stakeholder Initiative) launched in November of 2020. The Duke University Nicholas Institute for Environmental Policy Solutions, under contract with the Energy Office, supported the planning and facilitation of this stakeholder process. The recommendations reflect the discussions of voluntary stakeholder working groups, but not every recommendation reflects consensus.

**We appreciate the work and dedication of each and every stakeholder!**

## PURPOSE & GOAL

The EV Stakeholder Initiative facilitated a collaborative statewide discussion to explore opportunities to advance electric vehicle (EV) deployment in South Carolina, with the goal of developing policy and programmatic recommendations.

### Statewide EV Awareness Effort

Develop and fund a brand-agnostic EV awareness campaign for South Carolina, including:

- Conduct education and outreach to public entities and the public at-large
- Create a publicly accessible, online resource hub to serve as a one-stop shop
- Promote equity throughout all SC communities and sectors

### Statewide Public-Private Collaboration

Assemble a neutral statewide committee to facilitate continued honest EV conversations, providing a forum for factual communication of expert information to identify solutions and develop tools and programs for the burgeoning EV industry in South Carolina.

- Evaluate potential rate designs as transportation transitions to EVs
- Create an EV workforce development plan
- Identify incentives and financing opportunities

### Statewide Electrification Roadmap

Create a roadmap for attracting and advancing economic development opportunities for EV manufacturing, workforce development, EV infrastructure, and EV sales within the state, including goals for state agencies, PSC and others involved in deployment of EVs and EV infrastructure.

- Develop voluntary minimum standards for EV charging infrastructure and design

- Prioritize deployment of EV infrastructure along critical corridors, such as evacuation routes, in coordination with local public and private efforts
- Ensure passenger EV availability throughout South Carolina

### Legislative Consideration and Actions

In addition to the efforts mentioned above, the following recommendations require the Legislature's consideration and potential law and policy changes related to the electrification of transportation.

- Equity/Environmental Justice: Ensure EV programs and infrastructure benefit and engage areas disproportionately impacted by vehicle-related health and noise impacts
- Resilience: Enable the use of EV batteries during emergencies and instances of sustained power outages with implementation of vehicle-to-grid opportunities
- Accessibility: Ensure passenger EV availability and affordability throughout SC
- Financing Mechanisms: Provide incentives and tax credits to encourage EV adoption
- Planning and Funding: Provide state resources to support further EV planning efforts

# PURPOSE

This Report summarizes the collaborative work of stakeholders during the South Carolina Electric Vehicle Stakeholder Initiative conducted by the Energy Office of the SC Office of Regulatory Staff (Energy Office). The South Carolina Electric Vehicle Stakeholder Initiative (EV Stakeholder Initiative) launched in November of 2020 and involved over 350 stakeholders. The Energy Office contracted the services of the Duke University Nicholas Institute for Environmental Policy Solutions to support the planning and facilitation of the stakeholder process. An Advisory Committee, a diverse and broadly representative group, was formed and met regularly to provide guidance to the Energy Office.

The purpose of the EV Stakeholder Initiative was to facilitate a collaborative statewide discussion to explore opportunities to advance electric vehicle (EV) deployment in South Carolina, with the goal of developing a list of policy and programmatic recommendations to further EV deployment. The recommendations resulting from the EV Stakeholder Initiative reflect the work of the voluntary stakeholder working groups. **As a result, not all recommendations reflect consensus among all stakeholders, but are included for the purpose of furthering discussion and continued information exchange. We appreciate the work and dedication of each and every stakeholder.**

## ABOUT THE SOUTH CAROLINA ENERGY OFFICE

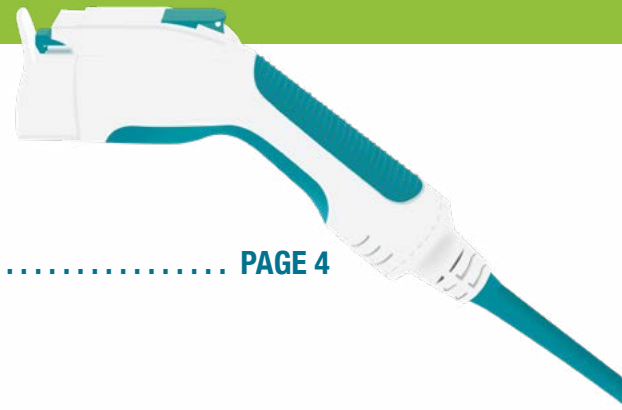
The Energy Office is a department within the SC Office of Regulatory Staff (ORS) and is funded by the US Department of Energy's State Energy Program. The mission of the Energy Office is to promote energy efficiency, renewable energy, and clean transportation through a variety of initiatives and programs that include:

- Developing the State Energy Plan
- Providing Technical Assistance
- Offering Financial Assistance
- Conducting Education and Outreach
- Maintaining Energy Data Resources

In addition, the Energy Office houses the Palmetto Clean Fuels Coalition (PCF), which is part of the US Department of Energy's Clean Cities Coalition Network. This network is a grassroots, locally based, voluntary public/private partnership with the goal of promoting energy use in the transportation sector that is clean, safe, less dependent upon foreign sources, and sustainable. PCF works with vehicle fleets, fuel providers, community leaders, and other stakeholders.



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# EV STAKEHOLDER INITIATIVE OVERVIEW

## PART ONE

In November of 2020, the Energy Office of the SC Office of Regulatory Staff (Energy Office) launched the South Carolina Electric Vehicle Stakeholder Initiative (EV Stakeholder Initiative). The purpose of the EV Stakeholder Initiative was to facilitate a collaborative statewide discussion among stakeholders to explore the opportunities to advance EV deployment in the state, with the goal of developing a list of policy and programmatic recommendations for electric vehicle deployment in South Carolina. The Energy Office contracted the services of the Duke University Nicholas Institute (Nicholas Institute) to support the planning and

facilitation of the stakeholder process.

The objectives of the EV Stakeholder Initiative were to:

- Examine the legislative and regulatory environment surrounding electric vehicles (EVs) and EV charging station access and adoption.
- Identify challenges and opportunities for EVs and EV charging stations.
- Develop recommendations surrounding EV penetration and EV charging stations in SC.

## EV STAKEHOLDER INITIATIVE: STRUCTURE AND PROCESS



### EV Core Group

The EV Core Group consisted of staff from the Nicholas Institute and the Energy Office to guide and implement the EV Stakeholder Initiative.

### Advisory Committee

The components of this process included the formation of an Advisory Committee – a 17-member group representative of a wide array of diverse perspectives and backgrounds. Individuals selected for the Advisory Committee were deemed to possess an understanding of the opportunities for transportation electrification, a network of connections to EV stakeholders, and a passion for the topic. The Advisory Committee included representatives from the following organizations:

- SC Department of Administration, State Fleet Management
- SC Department of Commerce (DOC)
- SC Department of Health and Environmental Control
- SC Department of Insurance
- SC Department of Transportation (DOT)
- City of Greenville
- SC Association of Municipal Power Systems (SCAMPS)
- Duke Energy
- Electric Cooperatives of South Carolina
- Clemson University - International Center for Automotive Research
- Conservation Voters of South Carolina
- Southern Alliance for Clean Energy
- Chargepoint
- Proterra
- Volvo
- SC House of Representatives
- SC Senate

**The tasks of the Advisory Committee were:**

1. Provide input and guidance to inform the strategic objectives of the EV Stakeholder Initiative.
2. Provide input on content and approach for stakeholder workshops.
3. Identify key stakeholders and experts in South Carolina to participate in working groups.
4. Serve as co-leaders of a “working group” and ensure the smooth progression of working group recommendations, identify areas for coordination and consolidation, and identify additional needs.
5. Review a draft of the final Report.

**Working Groups**

Following an initial Advisory Committee workshop in November of 2020, stakeholders formed five (5) Working Groups comprised of individuals with various subject-matter expertise to examine the challenges and opportunities related to the following:

- Education, Outreach, and Workforce Development
- Equity and Accessibility
- EV Infrastructure
- Incentives and Financing
- Public Entities

The Working Groups met monthly throughout 2021 to identify challenges and opportunities, discuss relevant research, and develop recommendations. Each of the resulting recommendations is outlined later in this Report. Additional content from discussions for the recommendations may be found on the Energy Office website under SC EV Stakeholder Initiative.<sup>1</sup>

**Workshops & Educational Webinars**

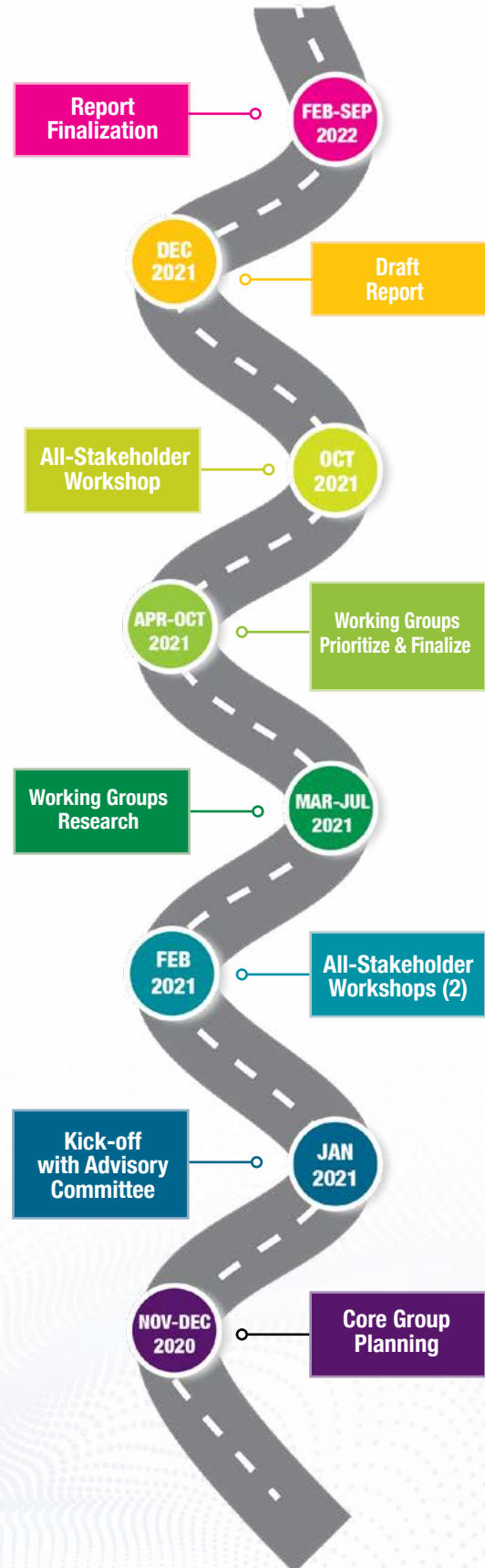
The EV Stakeholder Initiative launched with two (2) workshops held in February and March 2021:

**EV Stakeholder Workshop #1**

**February 17, 2021**

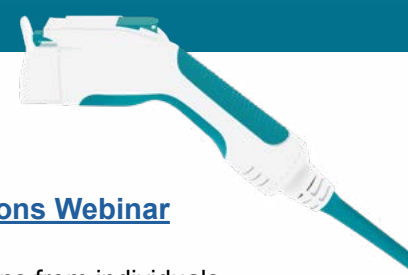
This workshop officially kicked off the EV Stakeholder Initiative. The purpose of the workshop was to introduce the objectives of the EV Stakeholder Initiative to the full spectrum of stakeholders and any other citizens interested in transportation electrification. Specifically, the workshop served to foster a sense of community among of the wide array of EV stakeholders in the state, create a shared understanding of the current EV and EV infrastructure landscape with common terminology, and introduced the Advisory Committee, the proposed Working Group topic areas, and the proposed EV Stakeholder Initiative process.

**Figure 1. EV Stakeholder Initiative Timeline**



<sup>1</sup> <https://energy.sc.gov/evinitiative>





### EV Stakeholder Workshop #2<sup>2</sup> March 2, 2021

In the second workshop, stakeholders selected Working Groups and engaged with to identify relevant challenges and opportunities within each Working Group topic area.

Throughout 2021, several educational webinars were held to further inform the stakeholders of key issues surrounding EV adoption. For each of the webinars, subject-matter experts discussed complexities surrounding the topic. Recordings of each of the webinars are available on the Energy Office website and via the following links:

#### [EV Infrastructure Webinar](#) May 17, 2021

The webinar included presentations on the topics of EV infrastructure technology, EV charging station use cases, and the regional EV landscape.

#### [EV Rate Design Considerations Webinar](#) June 22, 2021

The webinar featured presentations from individuals with the Regulatory Assistance Project with expertise on transportation electrification and rate design issues.

#### [Power of Stakeholder Groups Webinar](#) August 5, 2021

The webinar focused on the use of stakeholder groups to advance discussions of electrification and related topics.

#### [EV Stakeholder Final Workshop](#) October 28, 2021

A final all-stakeholder workshop was held to review and solicit feedback on final recommendations from each of the five (5) working groups. Additionally, workshop participants responded to a questionnaire. Results of this additional stakeholder input are included in Appendix A.

**Figure 2. SC EV Stakeholders by Sector**  
Stakeholder By Sector

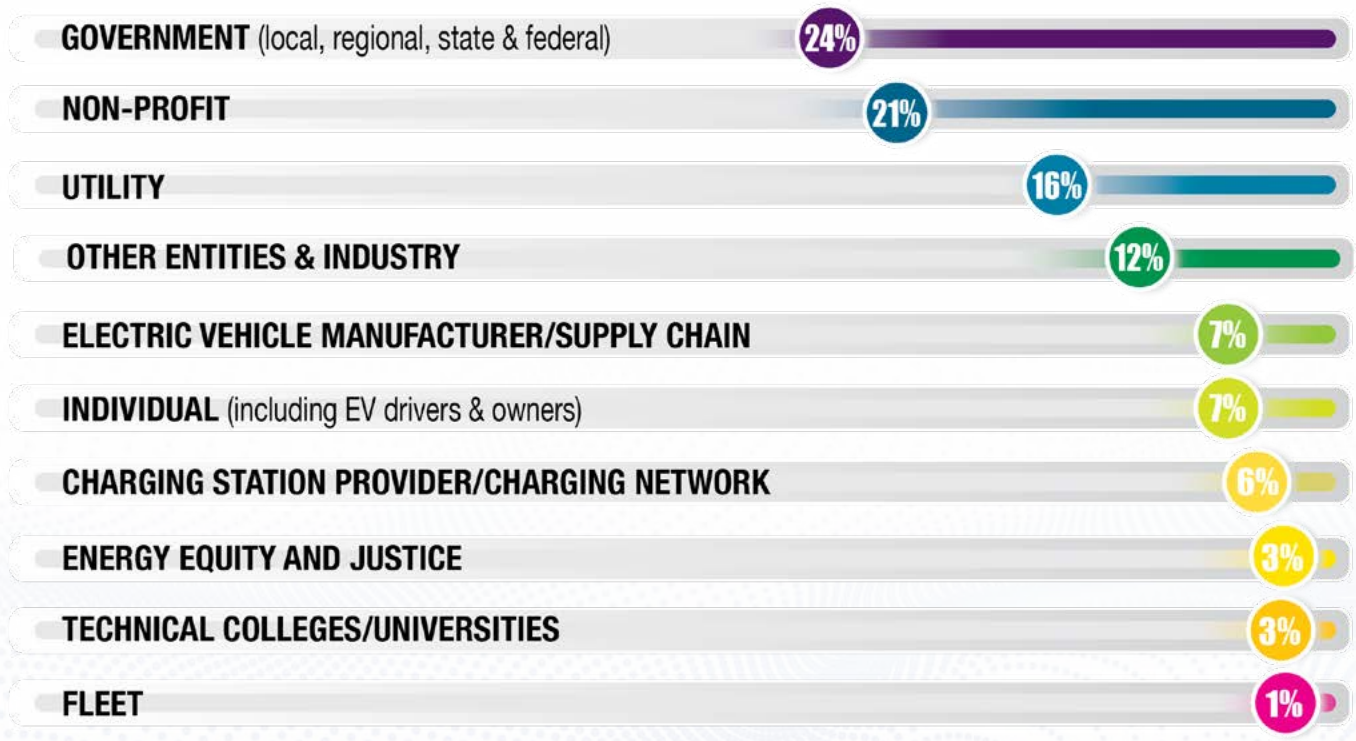


Figure 2 The SC EV Stakeholder Initiative included over 350 participants from a wide range of sectors.

<sup>2</sup> This Workshop hosted participants in breakout sessions and therefore was not recorded.



## Key Factors

Three key factors provided context for the discussions of the EV Stakeholder Initiative Working Groups. The factors were: 1) equity considerations 2) South Carolina Act 46, and 3) the Federal Infrastructure Investment and Jobs Act.

- Equity Considerations<sup>3,4</sup>  
At the kickoff workshops held in February and March 2021, stakeholders identified various foundational pillars that would guide the subsequent process. Equity and environmental justice were identified as key considerations. Given the significance of these issues, there was consensus among stakeholders that, in addition to forming a working group to focus on these issues, equity and environmental justice should serve as guiding considerations in the discussions of all the Working Groups.
- Act 46  
Signed by South Carolina Governor Henry McMaster in May 2021, Act 46 references the EV Stakeholder Initiative, and provides for the creation of a Joint Legislative Committee on the Electrification of Transportation. Among other electrification policy

considerations, the law outlines various issues to be considered by the EV Stakeholder Initiative.

- Infrastructure Investment and Jobs Act (Infrastructure Act or IJJA)  
This Federal legislation provides funding to states and local governments to expand EV charging infrastructure, electrify buses and transit, demonstrate and deploy battery technologies, improve alternative fuel vehicle access at schools, and enhance on- and off-road clean transportation options. In particular, the Infrastructure Act provides a total of \$7.5 billion to support EV charging through two programs: the National EV Formula Program and the Charging and Fueling Infrastructure Program.<sup>5</sup>

An overview of the final recommendations resulting from the EV Stakeholder Initiative is included in Figure 3. The final recommendations are listed by Working Group topic, with an indication of which recommendations addressed the aspects of each of the key factors.

3 EPA Environmental Justice definition - Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. (<https://www.epa.gov/environmentaljustice>)

4 DOE statement Equity in Energy is working to secure America's national security and energy dominance through maximizing and engaging all human capital to ensure America's independence for generations to come. (<https://www.energy.gov/diversity/equity-energytm>)

5 These programs are discussed in greater detail later in Part Four of this Report as part of the State, Regional, and National Overview.



**Figure 3. Recommendations with Key Factors**

Working Group	NO.	Recommendation	Equity	Act 46	IIJA
<b>Education, Outreach, and Workforce Development</b>	1	Develop a statewide committee to facilitate conversations, education, and awareness as we work together to build out the industry in SC.	✓	✓	✓
	2	Develop and fund an EV workforce development plan for the state.	✓		
	3	Develop and fund a brand-agnostic awareness campaign for the state.	✓		
	4	Work with the overall value chain to promote an effective, fair transition to electric vehicles.		✓	✓
	5	Create an online resource hub, to serve as a one-stop shop for various audiences, such as job-seekers, potential owners, dealers, and fleet managers.	✓		✓
<b>Equity and Accessibility</b>	6	Ensure EV charging incorporates requirements beyond minimum Americans with Disabilities Act (ADA). (“ADA plus”)	✓	✓	✓
	7	Develop a process to reduce barriers to participation in the electric vehicle decision-making process.	✓	✓	
	8	Enable the use of EV batteries for resilience purposes during emergencies and instances of sustained power outages.	✓		✓
	9	Support the adoption of e-bike implementation.	✓		
	10	Implement an “EV for schools” education program for Title I schools.	✓	✓	
	11	Encourage vehicle electrification in areas disproportionately impacted by vehicle-related health & noise impacts.	✓	✓	✓
	12	Determine the feasibility of EV infrastructure implementation at existing and new low- and moderate-income dwellings.	✓	✓	✓
<b>EV Infrastructure</b>	13	Create a Statewide Electrification Roadmap.	✓	✓	✓
	14	Expand the SC Alternative Fuel Infrastructure Tax Credit.		✓	
	15	Create an industry committee to focus on EV program and rate design.		✓	✓
	16	Develop voluntary minimum standards for EV chargers and station design.		✓	✓
	17	Deploy EV infrastructure along critical corridors.		✓	✓
	18	Ensure EV programs benefit multi-unit dwelling (MUD) and encourages electrification in disadvantaged areas.	✓		✓
<b>Incentives and Financing</b>	19	Create incentives and financing mechanisms to reduce the upfront costs for consumers.	✓		
	20	Encourage electrification of private and public light, medium, and heavy-duty fleets.		✓	✓
	21	Ensure passenger EV availability throughout South Carolina.	✓	✓	✓
	22	Engage utilities to accelerate transportation electrification.		✓	✓
<b>Public Entities</b>	23	Develop a needs assessment and an educational campaign.		✓	
	24	Develop planning and zoning mechanisms.		✓	
	25	Provide decision-support tools and resources.		✓	✓
	26	Identify and evaluate financial mechanisms.		✓	
	27	Continue engaging with utilities on options for public entities.		✓	✓



# PART TWO

## RECOMMENDATION SUMMARIES

As noted previously, following the initial Advisory Committee workshop stakeholders formed five topical **Working Groups** comprised of individuals with various subject-matter expertise to examine challenges and opportunities:

- Education, Outreach, and Workforce Development
- Equity and Accessibility
- EV Infrastructure
- Incentives and Financing
- Public Entities

Throughout 2021, the Working Groups met at least monthly to identify the challenges associated with the electrification of transportation and develop recommendations to address those challenges. The process involved identifying relevant research and information sources as well as utilizing an evaluation matrix that helped to refine and prioritize recommendations. The top recommendations from each of the five Working Groups are summarized.

**Please note that not all recommendations reflect consensus among all stakeholders but are included for the purpose of furthering discussion and continued exchange.**



# Education, Outreach, and Workforce Development Working Group

## Objectives

- Discuss challenges and opportunities regarding the need for education, outreach, and workforce development during the deployment of electric vehicles (EVs) in South Carolina.
- Generate recommendations to increase education, outreach, and workforce development to ensure a smooth transition to EVs and EV infrastructure in South Carolina.

NO.	Recommendation	The “What”	The “Why”
1	Develop a <b>statewide committee to facilitate conversations, education, and awareness</b> as we work together to build out the industry in South Carolina.	This committee would include a broad range of interested parties that would also serve as a speaker’s bureau who represent various perspectives and can support education sessions and lunch and learn type opportunities.	This recommendation addresses challenges of providing education to interested parties, allowing for continued insightful conversations and collaboration between stakeholders, and building continued awareness of this industry, while seeking to leverage the opportunities it creates, and address current and emerging challenges.
2	Develop and fund an <b>EV workforce development plan</b> for the state.	The plan may include an asset map/ industry market survey, curriculum for EV professionals, and options for EV-focused small businesses.	In order for SC to continue to be competitive, the state needs to ramp up training delivery models for the manufacturing sector, dealership, and the installation of charging stations, without creating job losses within the current automotive workforce.
3	Develop and fund a <b>brand-agnostic awareness campaign</b> for the state.	The campaign may include messaging research, videos, events, mobile EV discovery center, translation, youth programming, and an outreach plan for hard-to-reach populations.	A multi-faceted marketing strategy/ awareness campaign is needed to target various populations to increase EV awareness and adoption in the state.
4	Work with the overall value chain to <b>promote an effective, fair transition</b> to electric vehicles.	Working together to think through new business models to overcome potential losses and developing educational materials to bring auto dealers, service stations and independent mechanics along in this transition proactively.	As the interest in electric vehicles increases throughout the state, there is a need for the automotive industry and those serving the industry to be better informed about the benefits of EVs.
5	<b>Create an online resource hub</b> , to serve as a one-stop shop for various audiences, such as jobseekers, potential owners, dealers, and fleet managers.	A website to provide education and address misinformation about electric vehicles and serve as a neutral, trusted source of information on EVs in the state.	This recommendation seeks to address a gap in knowledge in regard to electric vehicles in South Carolina.

## Equity and Accessibility Working Group

### Objectives

- Discuss challenges and opportunities regarding the implementation of EVs in South Carolina for disinvested communities and those with accessibility issues.
- Generate recommendations to ensure equitable access to EVs and EV infrastructure in SC.

Many recommendations discussed in this working group were merged with recommendations from each of the other working groups as equity and accessibility are overarching themes.

NO.	Recommendation	The “What”	The “Why”
6	Determine Americans with Disabilities Act ( <b>ADA</b> ) plus accessibility requirements.	Outline necessary considerations to ensure an equitable and dignified user experience for EV owners who may interact with a handicap accessible EV charging station.	While there are requirements for parking spaces and EV infrastructure, many of these requirements do not address individual needs. ADA compliant is not necessarily accessible.
7	Develop a process to reduce <b>barriers to participation</b> in the electric vehicle decision-making process.	Ensure that an enhanced community engagement and participation process is put into place to ensure that EV investment decisions support and reflect the needs and desires of geographically, economically, and racially diverse communities.	The decision-making process is currently split between multiple state agencies, making community and stakeholder participation more difficult. Public engagement efforts often lack a comprehensive representation of communities with insufficient accommodations to facilitate their inclusion.
8	Enable the use of EV <b>batteries for resilience</b> purposes during emergencies and instances of sustained power outages.	Determine the electric power needs of the community and its individuals during an emergency, and design and implement demonstration pilots.	Providing electric power in the event of outages through the use of batteries can provide communities and its individuals with clean solutions to resilience challenges. Batteries can also become an important part of microgrids fueled with fossil generators.
9	Support the adoption of <b>e-bike implementation</b> .	Provide incentives (rebates or tax credits) for people to purchase bikes and support electric bike share-a-ride programs for low- and middle-income communities.	Electric cars and trucks are beyond the financial means for many low and middle-income families. A more inexpensive EV, such as an e-bike, should be available, along with the creation of safe bike lanes.
10	Implement an “ <b>EV for schools</b> ” education program for Title I schools.	Explore adoption of a program model based on <a href="#">Austin Energy’s EVs for Schools program</a> , similar to solar for schools programs.	As EV implementation increases in SC, it is important to ensure the equitable access of EV benefits to communities that are not among the groups of EV first adopters.
11	Encourage vehicle electrification in areas disproportionately impacted by vehicle-related <b>health &amp; noise impacts</b> .	Implement incentives and policies to reduce healthcare costs and the environmental burdens on impacted communities.	To address the disproportionate air and noise pollution burden that disinvested and low- to moderate-income communities face from a high concentration of fossil fuel-powered vehicles.
12	Determine the feasibility of EV infrastructure implementation at existing and new <b>low- and moderate-income dwellings</b> .	Investigate EV infrastructure implementation through low-income housing tax credit incentives, public housing authorities, and utility multifamily programs.	As EV adoption increases, it is imperative that EV infrastructure is available to all including those living in low- and moderate-income multifamily housing where charging infrastructure installations are more challenging.



# EV Infrastructure Working Group

## Objectives

- Discuss challenges and opportunities regarding the establishment of EV infrastructure in SC regarding light- & heavy-duty vehicles, corridor and commercial charging, and utility programs.
- Generate recommendations to ensure reliable, safe, equitable access to EV infrastructure in SC.

NO.	Recommendation	The “What”	The “Why”
13	Create a <b>Statewide Electrification Roadmap</b> .	Create a plan to advance EV manufacturing/workforce development, EV infrastructure, and EV sales within the state. This document would set the stage for state agency and Public Service Commission (PSC) involvement for EVs, including goals and targets.	Currently, there is no state plan for the deployment of EVs and EV infrastructure, nor to attract EV investments into SC. Many Southeastern states developed EV roadmaps or master plans that set the stage for their state’s EV economic development.
14	Expand the SC <b>Alternative Fuel Infrastructure Tax Credit</b> .	The expansion to include EV chargers and other alternative fuels, such as hydrogen, biodiesel, and renewable diesel. Currently, the 25% income tax credit only applies to propane and natural gas and expires January 1, 2026.	Expanding this tax credit to all alternative fuels would promote economic development within the state as well as job development to install alternative fueling and charging stations and prevent the state from picking “winners and losers.”
15	Create an industry committee to focus on <b>EV program and rate design</b> .	Industry is encouraged to create a working group of fleets, original equipment manufacturers (OEMs), charging providers, utilities, community groups, etc.	This would enable industry to communicate and provide expert information to the Statehouse, the Public Service Commission, and be involved in the EV policy discourse.
16	Develop voluntary <b>minimum standards for EV chargers and station design</b> .	Develop guidance and education for charger installers and providers regarding Americans with Disability Act (ADA) compliance, technology flexibility and power levels, and safety/reliability elements to station design.	While there are requirements for parking spaces and infrastructure, not many are tailored to EV chargers and station designs. As EV use increases so will the breadth of EVs and EV charging manufacturers. This recommendation seeks to help standardize signage and station designs, as well as consumer safety and reliability.
17	Deploy EV infrastructure along <b>critical corridors</b> .	Engage state energy and transportation agencies with funding to develop EV infrastructure along corridors to facilitate personal and commercial travel, and economic growth [that support freight, evacuation, tourism, and transit].	By developing corridors that facilitate the travel of EVs, SC will be encouraging economic development throughout the state through freight logistics, tourism, transit; as well as providing safe and reliable evacuation routes for EV drivers.
18	Ensure EV programs benefit <b>multi-unit dwelling (MUD)</b> and encourages electrification in <b>disadvantaged</b> areas.	Update state and local building codes to encourage development of charging infrastructure at MUDs and other structures that do not have garages. Investigate “Right to Charge” legislation with the SC Residential Landlord Tenant Act. Encourage up to 40% of funds from state-funded EV infrastructure programs benefit disadvantaged communities.	Ensuring MUDs have charging infrastructure will benefit South Carolinians and encourage further transportation electrification by reducing installation hurdles that renters currently face.

# Incentives and Financing Working Groups

## Objectives

- Discuss challenges and opportunities regarding financial incentives to encourage the implementation of EVs in South Carolina.
- Generate recommendations to bank the financial burden and ensure a smooth transition to EVs and EV infrastructure in South Carolina.

NO.	Recommendation	The “What”	The “Why”
19	Create incentives and financing mechanisms to <b>reduce the upfront costs</b> for consumers.	Implement rebates, tax incentives, cost-effective utility-based incentives, and a green bank. <sup>6</sup>	Given the benefits of EVs to consumers and the environment, and the fact that the lifetime costs of EV ownership are considerably less than traditional internal combustion engine (ICE) vehicles, it is beneficial to find ways to lower the upfront costs of EV purchases, particularly for low-income customers.
20	Encourage electrification of private and public light, medium, and heavy-duty <b>fleets</b> .	Create incentives and financing mechanisms for public and private fleets.	The current landscape in SC does not lend itself to the electrification of fleets. There are no incentives encouraging companies to pursue and achieve fleet electrification.
21	Ensure <b>passenger EV availability</b> throughout South Carolina.	Reduce obstacles currently limiting EV availability in SC such as enabling manufacturers to sell and service direct to customers, implementing low-carbon fuel standards, developing manufacturer and dealer incentives, supporting auto dealers’ transition, and incentives for used EVs.	As of the writing of this Report, there are a limited number of EV models available in SC. Contributing factors may include: SC’s limits on which automakers can sell and service their vehicles in the state, SC’s lack of zero-emission vehicle standards, and SC provides no dealer transition support.
22	<b>Engage utilities</b> to accelerate transportation electrification.	Leverage the utilities’ assets and capabilities to accelerate adoption of EVs and EV infrastructure. This can be accomplished through cost-effective customer rebates, make-ready incentives, EV rates, investment in fleet electrification, and investing in vehicle-to-grid technologies.	Cost-effective incentives to increase EV infrastructure in SC will help to assuage barriers to EV adoption like range anxiety.

<sup>6</sup> Green Banks are financial institutions designed to accelerate the transition to clean energy and boost resiliency in the face of environmental change. They are not deposit holding institutions and do not offer traditional banking services.

# Public Entities Working Group

## Objectives

- Identify challenges and opportunities faced by public entities (state agencies, municipalities, and public colleges and universities) associated with deploying EVs for fleets.
- Generate recommendations to enable public entities to procure EVs and EV infrastructure in SC.

NO.	Recommendation	The “What”	The “Why”
23	Develop a <b>needs assessment and an educational campaign</b> .	<p>This recommendation has 2 components:</p> <ul style="list-style-type: none"> <li>• Develop a needs assessment/survey of public entities throughout the state to determine fleet needs and challenges.</li> <li>• Develop and implement an educational campaign to provide information to public agencies, cities, and counties.</li> </ul>	<p>There is currently a lack of comprehensive understanding of the needs and challenges faced by various use cases and fleet types and provide information to address said needs and challenges.</p>
24	Develop <b>planning and zoning</b> mechanisms.	<p>Develop guidance for local governments on best practices and model codes and ordinances needed to support EV infrastructure deployment. Ensure that issues of equity are incorporated, such as with multi-family dwellings.</p>	<p>Planning and zoning mechanisms need to be put in place to enable communities to be EV-ready and prepared for possible future funding.</p>
25	Provide <b>decision-support tools</b> and resources.	<p>Provide decision makers with data from telematics and case studies, along with decision-support tools, that enable comparison of EVs to conventional fuel vehicles, and link them to funding opportunities available.</p>	<p>Decision makers for public entities may not currently have ready access to tools and data that will enable them to make thoroughly informed decisions.</p>
26	Identify and evaluate <b>financial mechanisms</b> .	<p>Identify and evaluate financial mechanisms to include cooperative purchase agreements, GSA program for surplus vehicle and tax credit transfers. Continue engaging with utilities through exploring managed charging opportunities, rate structures, and vehicle-to-grid and vehicle-to-x opportunities.<sup>7</sup></p>	<p>Decision makers for public entities do not have full awareness of, or access to, all financial mechanisms that will enable the purchase of EVs and EV charging equipment.</p>
27	Continue <b>engaging with utilities</b> .	<p>Continue engaging with utilities through exploring managed charging opportunities, rate structures, and vehicle-to-grid and vehicle-to-x opportunities.</p>	<p>Public entities need to have a more comprehensive understanding of how EV deployment and charging will affect their rates and how bi-directional charging can provide benefits in terms of resilience, revenue, and others.</p>

<sup>7</sup> Vehicle-to-x is technology that enables energy to be pushed back to the power grid or other infrastructure from the battery of an electric car.



# PART THREE

## BACKGROUND

### Electric Transportation (ET) Pilot

In 2019, the ORS held a stakeholder meeting to discuss Duke Energy Carolinas' and Duke Energy Progress' applications filed with the Public Service Commission of South Carolina for an ET pilot project (<https://dms.psc.sc.gov/Web/Dockets/Detail/116874> and <https://dms.psc.sc.gov/Web/Dockets/Detail/116875>). While the stakeholder meeting focused on Duke Energy's regulatory applications, there was collective support among stakeholders for continued discussions on statewide electrification outside of the scope of the applications.

The EV Stakeholder Initiative provided a process and forum for the statewide discussion. Due to Act 46, the ORS shall continue its EV stakeholder engagement, providing reports to the legislature every two years.



# STATE, REGIONAL, & NATIONAL OVERVIEW

## South Carolina Overview

Various developments and activities have shaped the context of discussions around the electrification of transportation in South Carolina over the past several years. A brief overview of South Carolina developments or activities is outlined below, including the data that reflects the adoption of EVs and EV charging infrastructure in South Carolina as of the writing of this Report. Note that the overview is not comprehensive as it does not include local electrification initiatives. Developments in the electrification sector are changing rapidly.

## SC General Assembly Actions

On May 17, 2021, Governor Henry McMaster signed Act 46 into law. Act 46 requires action by the legislature, state agencies and the PSC. The full Act can be found on the [SC Statehouse website](#).

The initial provision of this legislation changed how EV charging stations can generate revenue through user fees. Prior to Act 46, EV charging stations providers could only generate revenue based on the time a vehicle sat in an EV parking space, rather than by the amount of electricity provided to fuel the vehicle. Through this law, an EV charging station is now able to assess a fee based upon the amount of electricity used by the kilowatt-hour (kWh).

Act 46 also created a Joint Legislative Committee on the Electrification of Transportation (Joint Committee), whose purpose is to “study the challenges and opportunities associated with the electrification of the transportation sector and make recommendations to the General Assembly to enable a fair, efficient, and cost-effective transition to electric transportation.”<sup>8</sup> The Joint Committee’s recommendations are to be informed by reports received from the ORS, the state agencies and the Public Service Commission of South Carolina (PSC) and the South Carolina Department of Revenue (DOR).<sup>9</sup>

The ORS was specifically required to “complete a stakeholder process to facilitate a broad, collaborative statewide discussion among stakeholders to explore the opportunities to advance electrification of the transportation sector along with identifying challenges associated with the advancement of electrification of the transportation sector.”<sup>10</sup> Act 46 referenced the existing EV Stakeholder Initiative and listed the following required components be included:

1. Working with stakeholders in the private and public sector, including the DOT, the DOC, the DOR, and other relevant stakeholders;
2. Examining the legislative and regulatory environmental, economic, and customer challenges and opportunities;
3. Identifying challenges and opportunities in electrified vehicle technologies, such as power conversion and energy storage, the grid integration of electrified transportation and transportation policies, that pave the way for electrified transportation; and
4. Identifying efforts to enable a more efficient and cost-effective transition to electric transportation.

Under Act 46, ORS “shall make initial recommendations to the Joint Committee no earlier than July 1, 2022.”<sup>11</sup> Furthermore, ORS “shall convene additional stakeholder initiatives and report recommendations to the Joint Committee at least every two years thereafter.”<sup>12</sup>

The PSC is required to open a docket, no earlier than April 1, 2023, for the purpose of identifying the regulatory challenges and opportunities associated with the electrification of the transportation sector through the study of listed issues.<sup>13</sup> While the Act does not set a deadline for the PSC’s initial report to the Joint Committee, the PSC is required to open a docket to study these issues every three years after submitting its initial report.<sup>14</sup>

8 See SC Code Ann. § 58-27-260(B)(1).

9 See SC Code Ann § 58-27-260(B)(2).

10 See SC Code Ann § 58-27-270(A).

11 See SC Code Ann § 58-27-270(D).

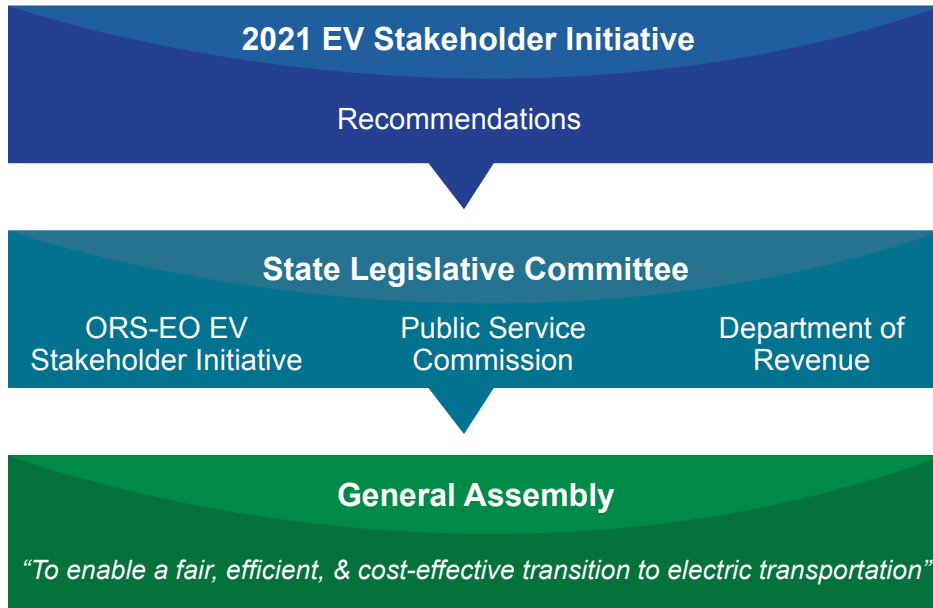
12 See footnote 11.

13 See SC Code Ann § 58-27-265(A).

14 See SC Code Ann § 58-27-265(B).

Finally, Act 46 requires the DOR by September first of each year, to provide the Joint Committee an annual report that “details the prior fiscal year’s revenue collections, from whatever source derived, designated for the repair, maintenance, or improvements of the South Carolina transportation system.”<sup>15</sup>

**Figure 4. Act 46: Advancing the Electrification of the Transportation Sector in SC**



In 2021, then Senate Finance Chairman Senator Hugh Leatherman created a Critical Transportation Infrastructure Funding Modernization Subcommittee to ensure the DOT’s future funding streams, which currently depend upon fuel tax collections, are adequate through recommendations to adapt and fund a growing state economy as alternative fuel automobiles predominate the market in light of the auto industry’s transition to EVs and improved fuel efficiency.<sup>16</sup> The Subcommittee met on June 8, 2021, and again on October 27, 2021.

**Additional Notable State Actions**

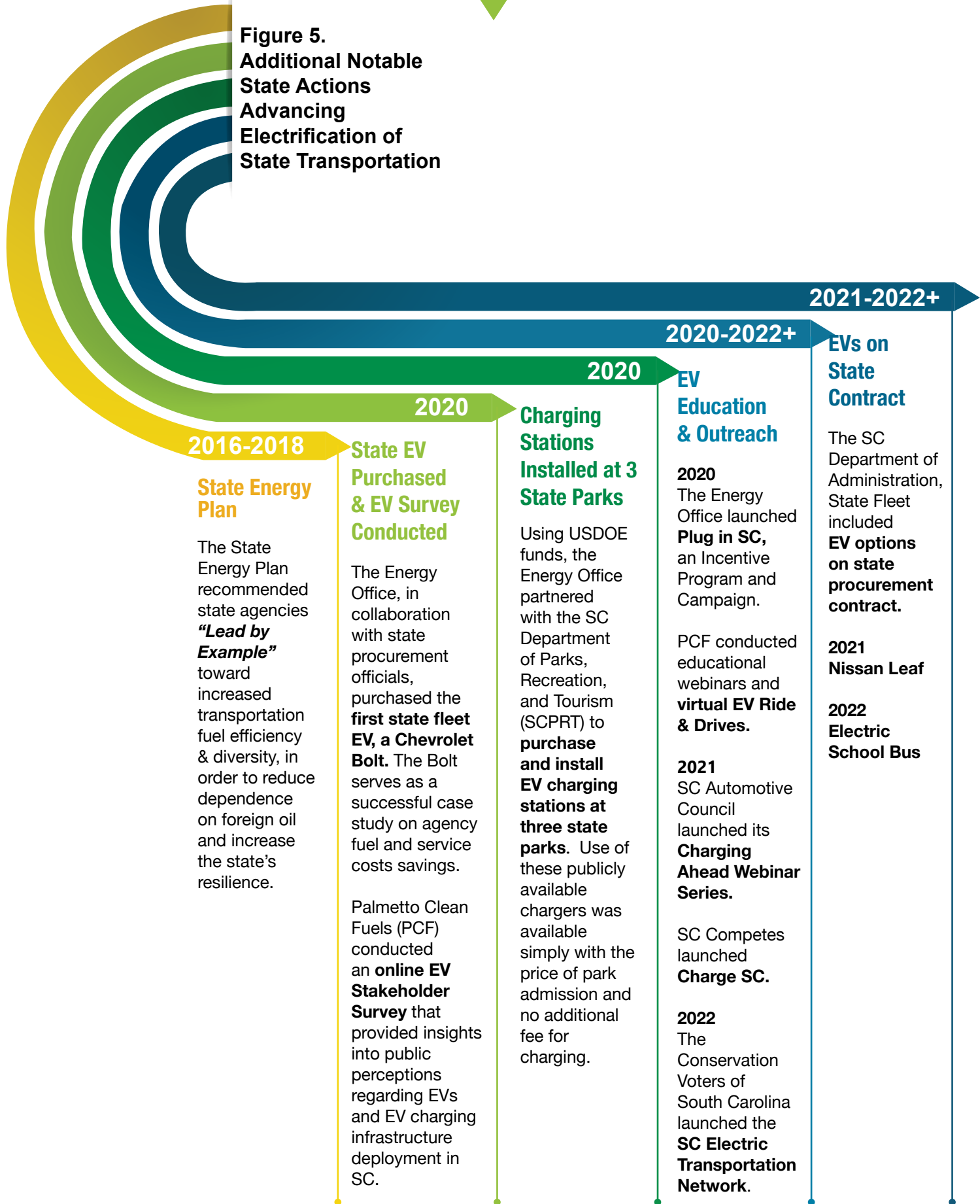
In addition to Act 46, other statewide actions have shaped the discussions regarding electric vehicles. These developments range from specific projects to multiple state organizations undertaking research or holding informational sessions. The graphic in Figure 5 provides an overview of the landscape of EV-related activities that have taken place during the past several years. More information on each of these is included in Appendix B.

<sup>15</sup> See SC Code Ann § 58-27-260(B)(2)(c).

<sup>16</sup> See video for Senate Finance Committee – Senate Finance Critical Transportation Infrastructure Funding Modernization Subcommittee, June 8, 2021, reading Memo from Senator Leatherman, dated May 19, 2021 . <https://www.scstatehouse.gov/video/archives.php>



**Figure 5.  
Additional Notable  
State Actions  
Advancing  
Electrification of  
State Transportation**



**2016-2018**

**State Energy Plan**

The State Energy Plan recommended state agencies **“Lead by Example”** toward increased transportation fuel efficiency & diversity, in order to reduce dependence on foreign oil and increase the state’s resilience.

**2020**

**State EV Purchased & EV Survey Conducted**

The Energy Office, in collaboration with state procurement officials, purchased the **first state fleet EV, a Chevrolet Bolt**. The Bolt serves as a successful case study on agency fuel and service costs savings.

Palmetto Clean Fuels (PCF) conducted an **online EV Stakeholder Survey** that provided insights into public perceptions regarding EVs and EV charging infrastructure deployment in SC.

**2020**

**Charging Stations Installed at 3 State Parks**

Using USDOE funds, the Energy Office partnered with the SC Department of Parks, Recreation, and Tourism (SCPRT) to **purchase and install EV charging stations at three state parks**. Use of these publicly available chargers was available simply with the price of park admission and no additional fee for charging.

**2020-2022+**

**EV Education & Outreach**

**2020**  
The Energy Office launched **Plug in SC**, an Incentive Program and Campaign.

PCF conducted educational webinars and **virtual EV Ride & Drives**.

**2021**  
SC Automotive Council launched its **Charging Ahead Webinar Series**.

SC Competes launched **Charge SC**.

**2022**  
The Conservation Voters of South Carolina launched the **SC Electric Transportation Network**.

**2021-2022+**

**EVs on State Contract**

The SC Department of Administration, State Fleet included **EV options on state procurement contract**.

**2021**  
**Nissan Leaf**

**2022**  
**Electric School Bus**

“Electric mobility is becoming a growth driver and success factor for the company”

Dr. Robert Engelhorn,  
President & CEO BMW  
Manufacturing

## SC EV Announcements

### SC Automotive Industry

The automotive industry in South Carolina continues to make numerous announcements related to upcoming production of EVs – both for national and global markets.<sup>15</sup> Here are some key facets of some of the most recent announcements, listed alphabetically.

#### Arrival<sup>16</sup>

- In October 2020, Arrival announced the establishment of its first U.S. microfactory in York County, to manufacture EVs – primarily buses and vans.
- Estimated \$46 million investment that will create 240 new jobs.

#### BMW, Plant Spartanburg<sup>17</sup>

- In 2021, BMW, Plant Spartanburg
  - o Saw a 48% increase in its number of EVs produced including: 39,883 X5 xDrive45e vehicles and over 30,000 X3 xDrive30e vehicles;
  - o Shipped 70,000 plug-in hybrid EVs to customers worldwide.
- In late 2022, BMW, Plant Spartanburg plans to begin series production of the all-new BMW XM, the first plug-in hybrid high-performance model in the BMW M portfolio in the family of X models.

#### Mercedes-Benz Vans<sup>18</sup>

- Starting the second half of 2023, Mercedes-Benz Vans to begin production of next generation eSprinter at three plants, including North Charleston, as the next stage of its electrification plan in pursuit of its 'Lead in Electric Drive' plan.
- Mercedes-Benz to invest around €50 million (approximately \$58 million) in each plant as part of electrification shift, to help develop new markets with a focus on the USA and Canada.

#### Oshkosh Defense<sup>19</sup>

- In June 2021, Oshkosh Defense, a subsidiary of Oshkosh Corporation, announced it is establishing operations in Spartanburg County.

- The \$155 million investment is expected to create more than 1,000 new jobs.
- The manufacturing operations will support the United States Postal Service (USPS) Next Generation Delivery Vehicle (NGDV) program. In July 2022 the USPS increased its initial order by about 20%.<sup>22</sup>

#### Proterra<sup>21</sup>

- In December 2021, Proterra announced it is expanding its South Carolina presence with a new EV battery system manufacturing facility in Spartanburg County.
- The \$76 million investment is expected to create more than 200 new jobs.
- Proterra is a leader in the design and manufacturing of zero-emission electric transit vehicles and EV technology solutions for commercial applications.

#### Volvo Cars<sup>22</sup>

- In June 2021, Volvo Cars announced plans to expand US EV production in Ridgeville, SC.
- This new \$118 million expansion brings the total Volvo Cars investment in South Carolina to more than \$1.2 billion.

#### ABB E-mobility Inc. (Charging Manufacturer)<sup>25</sup>

- Enables ABB E-mobility to meet increasing market demand for electric vehicle chargers.
- Manufacturing operations in Columbia, SC localizes the supply chain closer to customers and will create 100+ jobs.
- US manufactured charging products will serve public networks, school bus and fleet markets as early as 2023.

<sup>17</sup> This report focuses specifically on passenger (cars & buses) electric vehicles. In SC there is also growing activity around other electric transport such as electric scooters, rail switcher engines, and all-terrain vehicles.

<sup>18</sup> [Arrival to build its first U.S. electric vehicle Microfactory in York County | South Carolina Department of Commerce \(sccommerce.com\)](https://www.sccommerce.com/news/arrival-to-build-its-first-u-s-electric-vehicle-microfactory-in-york-county)

<sup>19</sup> [From the article \(BMW Manufacturing Sets Production Record in 2021 \(bmwgroup-america.com\)\)](https://www.bmwgroup-america.com/press-releases/2021/03/consistent-implementation-of-the-electric-strategy-of-mercedes-benz-vans-next-generation-esprinter-to-be-built-at-three-plants.pdf)

<sup>20</sup> [https://mbvcharleston.com/wp-content/uploads/2021/03/Consistent-implementation-of-the-electric-strategy-of-Mercedes-Benz-Vans\\_Next-generation-eSprinter-to-be-built-at-three-plants.pdf](https://mbvcharleston.com/wp-content/uploads/2021/03/Consistent-implementation-of-the-electric-strategy-of-Mercedes-Benz-Vans_Next-generation-eSprinter-to-be-built-at-three-plants.pdf)

<sup>21</sup> [Oshkosh Defense establishing operations in Spartanburg County | South Carolina Department of Commerce \(sccommerce.com\)](https://www.sccommerce.com/news/oshkosh-defense-establishing-operations-in-spartanburg-county)

<sup>22</sup> [U.S. Postal Service to boost electric delivery vehicle purchases. reuters.com, July 20, 2022](https://www.reuters.com/technology/2022/07/20/us-postal-service-to-boost-electric-delivery-vehicle-purchases-reuters-com-july-20-2022/)

<sup>23</sup> [Proterra expanding South Carolina operations with new EV battery system manufacturing facility in Spartanburg County | South Carolina Department of Commerce \(sccommerce.com\)](https://www.sccommerce.com/news/proterra-expanding-south-carolina-operations-with-new-ev-battery-system-manufacturing-facility-in-spartanburg-county)

<sup>24</sup> <https://www.media.volvocars.com/us/en-us/media/pressreleases/283096/volvo-cars-expands-us-electrified-vehicle-production-in-south-carolina-with-new-118-million-investment>

<sup>25</sup> Email announcement via SC Electric Transportation Network on September 14, 2022.

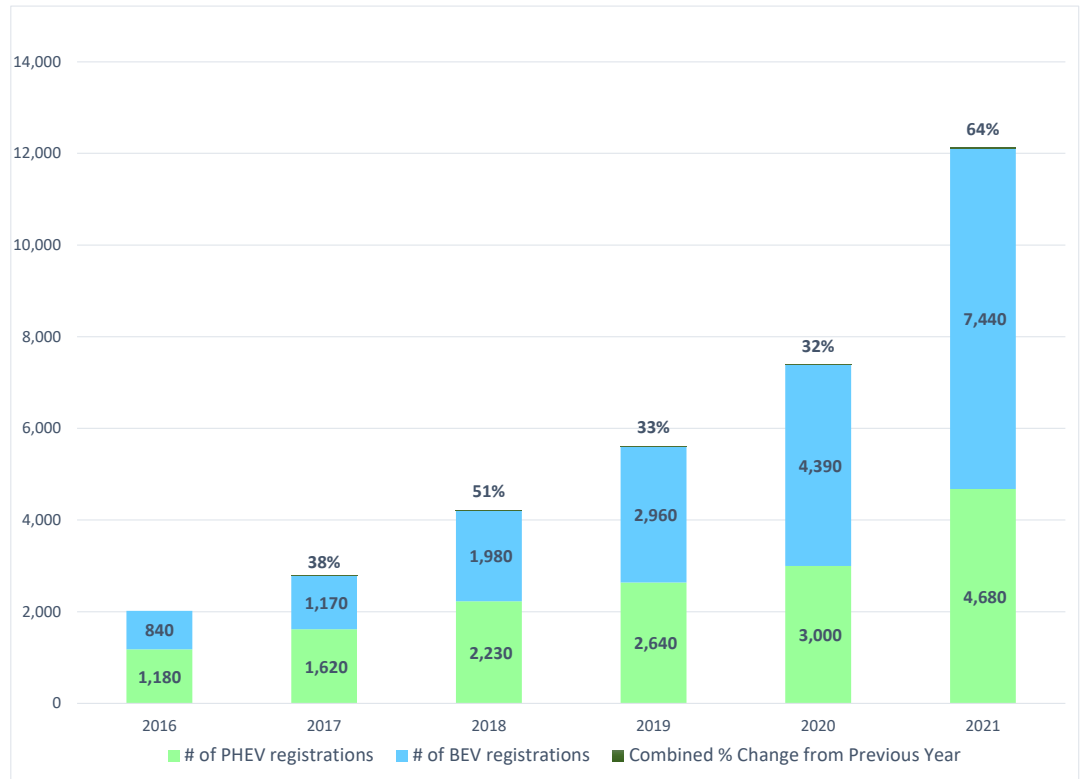
# EV-related Data, Trends, and Decision-Making Tools

This section provides a snapshot of EVs and EV charging locations in South Carolina as well as some of the planning tools currently available. During the creation of this Report, it became evident that the EV transition is quite dynamic and changes to available information and tools occur rapidly. While this Report offers an overview of the available information to date, it is not an exhaustive summary.

**Figure 6. Number of BEV and PHEV Registrations in SC<sup>27</sup>**

Displayed in Figure 6 are the number of battery electric vehicle (BEV) and plug-in hybrid electric vehicles (PHEV) registrations in South Carolina from 2016 through 2021.<sup>26</sup>

South Carolina is shown in comparison with other states in the Southeast for EV manufacturing indicators through December 2021. These findings are from the report, “Transportation Electrification in the Southeast,” that was produced by the Atlas Public Policy and Southern Alliance for Clean Energy.<sup>28</sup>



**Figure 7. SC Manufacturing Indicators through December 2021<sup>29</sup>**



## Manufacturing Employment

**#4 in the Southeast (total)**

- Jobs: 785
- Up to 200 from July 2021
- 1% of national total

## Manufacturing Investment

**#5 in the Southeast (total)**

- Investment: \$800.6 billion
- Up by \$75.6 million from July 2021
- 1% of national total

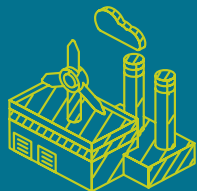


Figure 7 - Both measures include medium- and heavy-duty EVs. EV manufacturing employment and investment represent commitments made to specific facilities in the state.

26 BEVs use a battery to store electricity. Batteries are charged by plugging the vehicle into an electrical power source. PHEVs are powered by an internal combustion engine and an electric motor that uses energy stored in a battery. The vehicle can be plugged into an electrical power source to charge the battery or operate solely on gasoline.

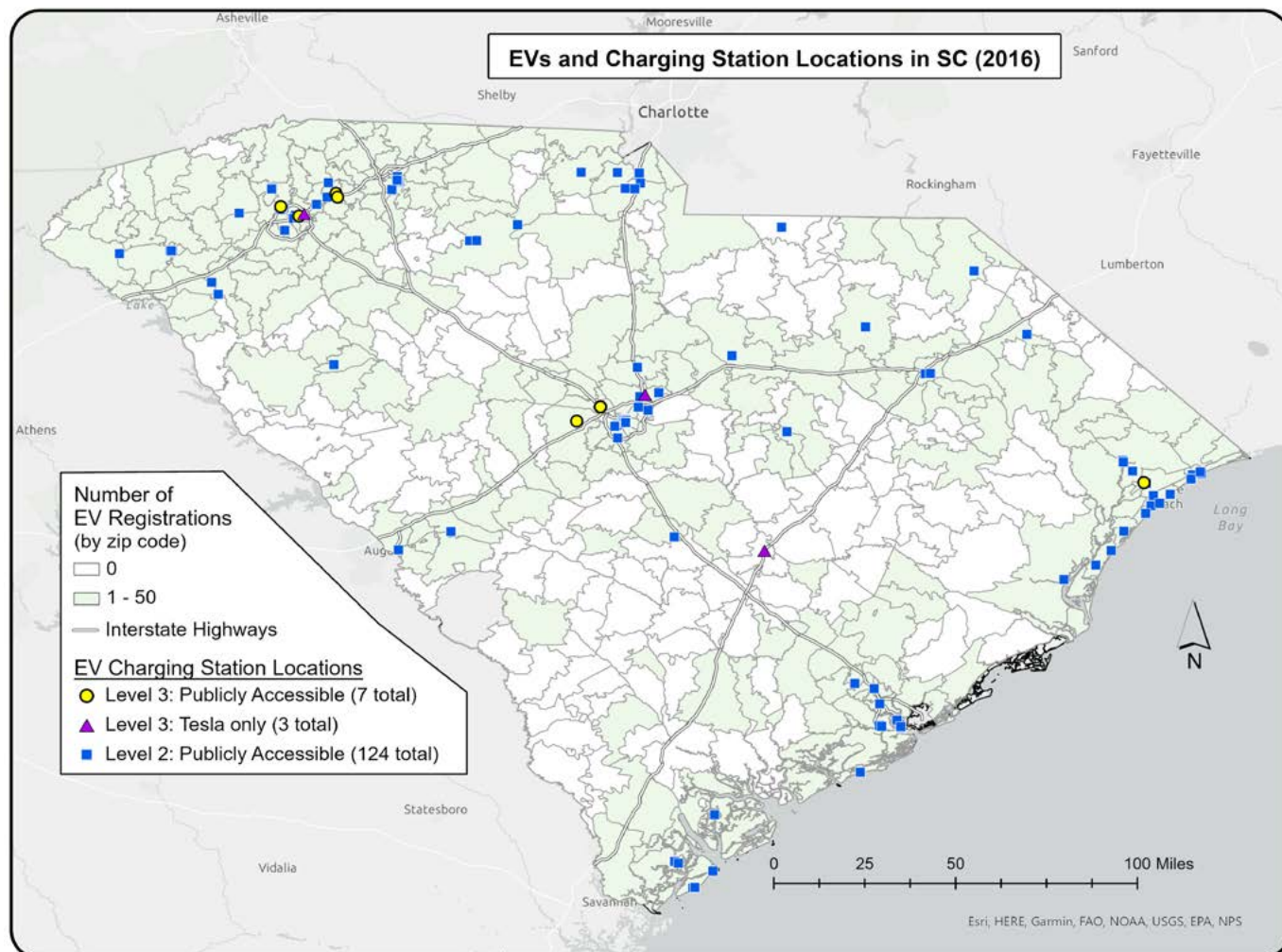
27 Derived registration counts by the National Renewable Energy Laboratory, Experian Information Solutions.

28 <https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-South-Carolina.pdf>

29 See footnote 28.



## Map 1. South Carolina EV Registrations and Charging Stations – 2016<sup>30</sup>



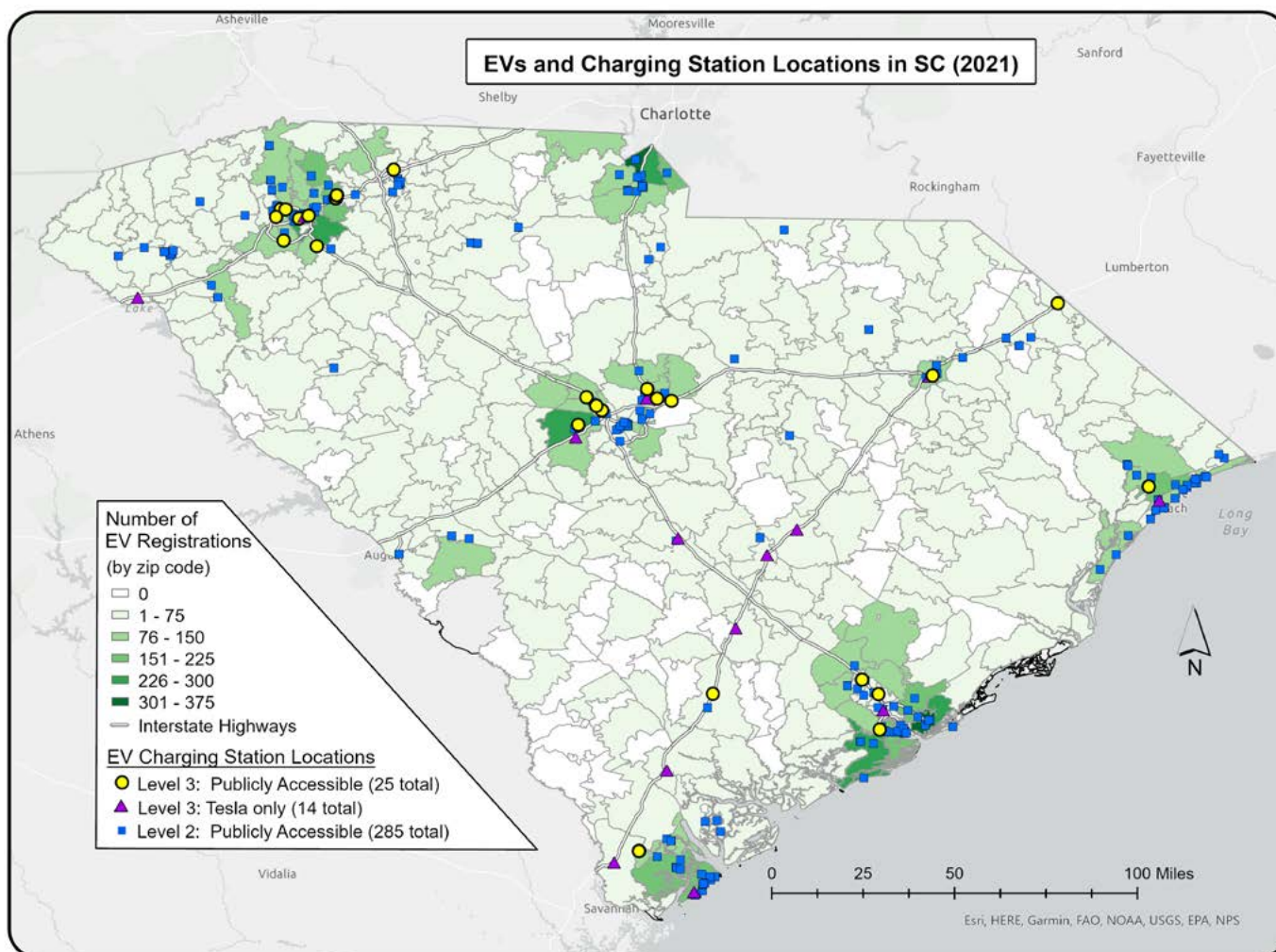
In conjunction with the increase in EV ownership in SC there has also been a rise in the number of EV charging stations. These two maps show a six-year comparison (2016-2021) of the locations of these EV stations as well as SC-registered BEVs and PHEVs. The maps show the publicly available charging station locations (free or for a fee), as well as those that are brand specific (i.e., Tesla).<sup>31</sup>

At each charging station location there may be more than one electric vehicle supply equipment (EVSE) charging port provided and potentially different levels of charging capability.

<sup>30</sup> Derived registration counts by the National Renewable Energy Laboratory, Experian Information Solutions. And the EV charging locations are from the [Alternative Fuels Data Center's](#) alternative fueling station locator map and associated data table.

<sup>31</sup> For more information on current charging locations in SC and different charger types, please see Appendix D.

## Map 2. South Carolina EV Registrations and Charging Stations – 2021<sup>32</sup>



Additional Level 2 and Level 3 (DC fast charging) charging locations exist but have limited availability for use by customers, employees, or fleets.

For perspective, as of June 28, 2022, there are a total of 432 stations at public and private locations for a total of 993 electric vehicle supply equipment (EVSE) ports in South Carolina according to the [Alternative Fuels Data Center \(AFDC\)](#). Resources on locating charging stations are available in Appendix D.

<sup>32</sup> Derived registration counts by the National Renewable Energy Laboratory, Experian Information Solutions. And the EV charging locations are from the [Alternative Fuels Data Center's](#) alternative fueling station locator map and associated data table.

**Figure 8. SC EV Indicators Through December 2021<sup>33</sup>**

**Sales**

**#5 in the Southeast (per capita)**

- Cumulative Sales: 10,176
- 63% Growth in 2021
- 2 EVs Sold per 1,000 people
- 1.9% of Market Share in 2021



**Charging Deployment**

**#5 in the Southeast (per capita)**

- Total: 839 ports
- 34% Growth in 2021
- 0.17 Ports per 1,000 people



As shown in Figure 8, a report, “Transportation Electrification in the Southeast,” produced by the Atlas Public Policy and Southern Alliance for Clean Energy compared sales and charging deployment indicators for SC with six other Southeastern states, through December 2021.<sup>34</sup>

The National Renewable Energy Lab projected changes in ownership of personal light duty vehicles over the next 30 years in Figure 9.<sup>35</sup> The top, solid line displays the ownership number of conventional gasoline or internal combustion engine (ICE) vehicles in SC over 30 years assuming no adoption of EVs. The graph also shows the predicted vehicle type of ownership with an increase in BEV and PHEV and a decrease in conventional gasoline engines.

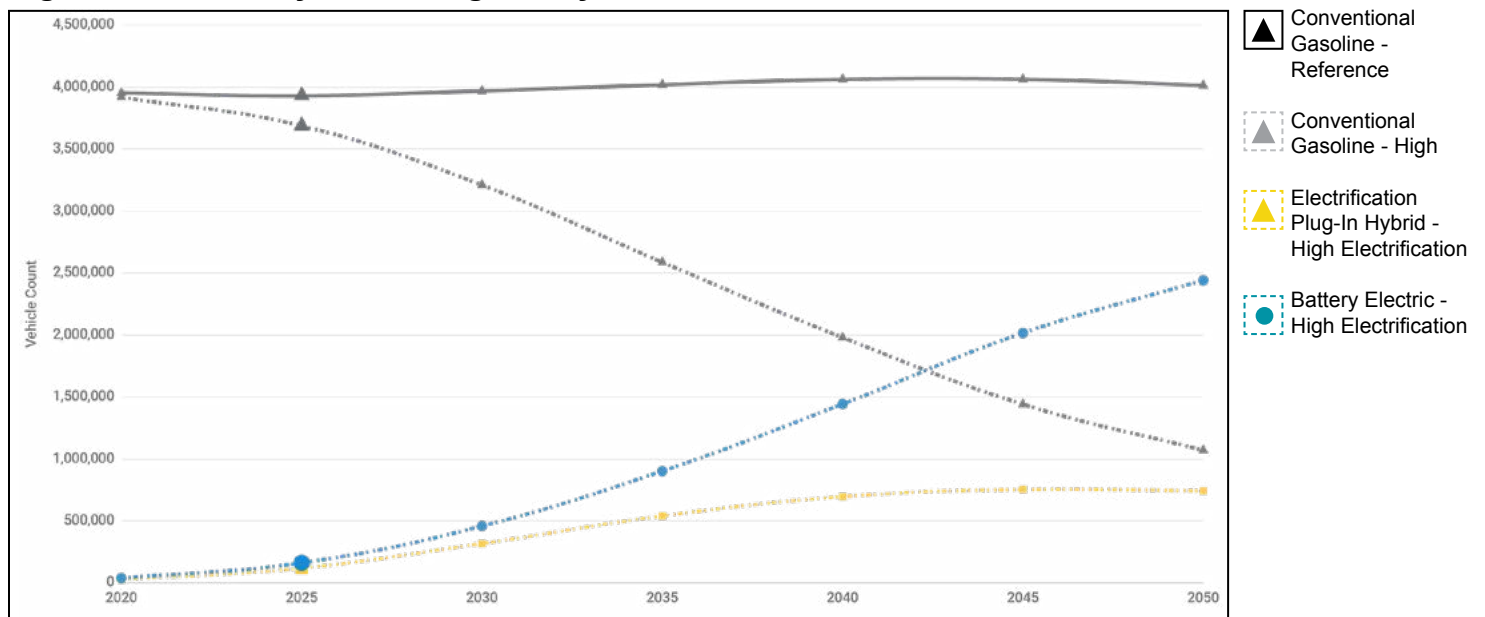
Additionally, it has been estimated that the SC economy could receive an approximately \$5.3 billion annual boost in transitioning to EVs. “Because SC imports all of its gas and diesel, when consumer and fleet operators buy fuel, 2/3 of

every dollar spent leaks out of the state’s economy to oil-rich states and countries. If all the cars, trucks, and buses in SC were electric today, consumers and fleet operators would pay approximately half as much on electricity [than] they do on gas and diesel, and the state would retain 2/3 of every transportation fuel dollar spent on electricity.” (Stan Cross, Southern Alliance for Clean Energy, personal communication, June 23, 2022) For more details, review the report, [Retained Fuel Spending in the Southeast](#).

**Decision-making Tools**

There is a growing set of tools and data available related to EVs. Some of these tools focus on parking data and dwell time to assist municipalities with the best placement of new EV charging stations.<sup>36</sup> Other tools compare lifetime costs of ownership of different vehicles (gasoline, electric, propane, etc.). There is also data that shows the energy and transportation burden at the census tract level in SC. Links to these resources and others can be found in Appendix D.

**Figure 9. Personally Owned Light Duty Vehicle Stock in SC<sup>37</sup>**



33 <https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-South-Carolina.pdf>

34 See footnote 33.

35 National Renewable Energy Laboratory. “Personally Owned Light Duty Vehicle Stock,” State and Local Planning for Energy, accessed 5/31/2022, <https://maps.nrel.gov/slope>.

36 Dwell time – Time spent in the same area.

37 See footnote 35.



## Southeast Regional Overview

### Southeast Regional Electric Vehicle Information Exchange (SE REVI)

Regional collaboration provides South Carolina insight and valuable information regarding EV trends and planning. Most notably, the Southeast Regional Electric Vehicle Information Exchange (SE REVI) was established in 2020 by various State Energy Offices throughout the Southeast under the facilitation of the National Association of State Energy Offices (NASEO).

Inspiration for the formation of SE REVI was the success of the [REV-WEST Initiative](#), a consortium of eight western states whose governors signed a bipartisan memorandum of understanding to provide a framework for creating an EV corridor to make it possible to drive an EV across major transportation corridors in the western part of the US.

SE REVI relies on voluntary coordination among the states' respective State Energy Offices to enable coordination across the region on EV infrastructure investments focused on sharing information, formation of best practices, and collaborative development of a multi-state EV infrastructure map.

The [interactive map](#) utilizes spatial data, including locations of current and planned Level 2 and DC fast chargers, state and national parks, Federal Highway Administration-designated [Alternative Fuel Corridors](#), hurricane evacuation routes, social equity data, and electric service provider territories. Developed with input from the SE REVI participants, the interactive map may be used to inform EV infrastructure investment decisions and to conduct education and outreach on EV infrastructure gaps and opportunities along priority corridors across the Southeastern region.

### SE REVI

11 Participating state and territory Energy Offices include:

- Alabama
- Arkansas
- Florida
- Georgia
- Kentucky
- Mississippi
- North Carolina
- Puerto Rico
- South Carolina
- Tennessee
- Virgin Islands

### Southeast Electric Transportation Initiative (SETRI)

[SETRI](#) is an initiative of Georgia Tech and the Duke University Nicholas Institute that originated in 2020. SETRI is a voluntary, non-partisan, independent electric transportation market development collaboration of stakeholders that includes vehicle manufacturers, charging station providers, supply chain companies, electric utilities, fleet managers, universities, Clean Cities coalitions, governmental agencies, and non-profit organizations. This group seeks to advance transportation electrification throughout the Southeast through efforts to:

1. promote regional EV market development
2. conduct education and outreach to consumers and decision makers
3. coordinate state electrification efforts and university research
4. collaborate with transportation electrification efforts outside the Southeast.

### National Overview

The US Congress passed the Bipartisan Infrastructure Investment and Jobs Act (Infrastructure Act) in November 2021.<sup>38</sup> The Infrastructure Act provides billions of dollars to states and local governments to expand EV charging infrastructure, electrify buses and transit, deploy battery technologies, improve alternative fuel vehicle access at schools, and enhance on- and off-road clean transportation options. The Infrastructure Act includes a total of \$7.5 billion to support EV charging infrastructure through two programs: the National Electric Vehicle Infrastructure (NEVI) Formula Program, and the Charging and Fueling Infrastructure Program. In addition, the Infrastructure Act includes \$5 billion over five years to support the Clean School Bus Program.

### National Electric Vehicle Infrastructure (NEVI) Formula Program

[NEVI](#) provides \$5 billion in dedicated funding to states to strategically deploy EV charging infrastructure and establish an interconnected EV network to facilitate data collection, access, and reliability. The federal funding is directed to be spent on Alternative Fuel Corridors as designated by the Federal Highway Administration. The law requires the state Departments of Transportation to develop and submit a plan to the newly formed federal Joint Office of Transportation and Energy. The goal of NEVI is to enable EV infrastructure to be installed every 50 miles along the states' portions of the Interstate Highway System within 1 travel mile of

<sup>38</sup> The Federal Infrastructure Investment and Jobs Act is also often referred to by various acronyms including IJA and BIL for the Bipartisan Infrastructure Law.

the interstate, ultimately creating a nationwide network of 500,000 EV chargers by 2030. Per the formula allocation, South Carolina is expected to receive a total of \$10.3 million for FY2022.<sup>39</sup>

### Charging and Fueling Infrastructure Program

In addition to the NEVI formula funding, the Infrastructure Act provides \$2.5 billion through discretionary grants to states and local governments to deploy EV charging and hydrogen/propane/natural gas fueling infrastructure along designated alternative fuel corridors and in communities. These grants are intended to support rural charging, build resilient infrastructure, and increase publicly-accessible EV charging access in underserved and overburdened communities. Additional guidance on how these funding programs will be administered is expected to be made available via the US Department of Transportation's [website](#).

### Low- or No- Emission Transit Bus Deployments

The Federal Transit Administration (FTA) offers approximately \$1.1 billion in competitive grants under the Low or No Emission Grant Program (Low-No Program) and approximately \$372 million under the Grants for Buses and Bus Facilities Competitive Program (Buses and Bus Facilities Program). See the [Federal Register Notice](#) for details. The Low-No Program supports the transition of the nation's transit fleet to the lowest polluting and most energy efficient transit vehicles. The Low-No Program provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses, including acquisition, construction, and leasing of required supporting facilities. The Buses and Bus Facilities Program assists in financing of buses and bus facilities capital projects, including replacing, rehabilitating, purchasing, or leasing buses or related equipment, and rehabilitating, purchasing, constructing or leasing bus-related facilities. Additionally, recipients are permitted to use a portion of the grant award for workforce development activities.

### Clean School Bus Program

The US Environmental Protection Agency (EPA) is administering \$5 billion over five years for the replacement of existing school buses with clean school buses and zero-emission school buses. Half of this amount (\$2.5 billion) is dedicated to zero-emission school buses. This [program](#) prioritizes school bus replacements in areas that have been historically underserved.

### Volkswagen (VW) Environmental Mitigation Settlement

The VW Mitigation Trust (Trust) totaling over \$2.9 billion nationally was established to mitigate excess emissions with the goal of offsetting the environmental damage caused by VW's use of "defeat devices." This mitigation was to reduce nitrogen oxide (NOx) emissions, primarily through the replacement of certain diesel engines or vehicles with cleaner diesel engines or engines using alternative fuel sources. For the state of South Carolina, Governor McMaster designated the SC Department of Insurance as the lead agency for administering SC's approximately \$34 million allocation as a beneficiary under the Trust. These funds were dispersed via two competitive rounds of applications. While the bulk of the VW funds were awarded to the SC Department of Education to purchase over 300 propane school buses, the funds were also awarded to several municipalities to procure a total of six electric transit buses. More information may be found [here](#).

### National Electric Highway Coalition

The National Electric Highway Coalition (NEHC) is a collaboration of electric utility companies that are committed to providing EV fast charging stations that will allow the public to drive EVs with confidence along major U.S. travel corridors by the end of 2023. The NEHC is the largest such alliance of electric utility companies that have organized around the common goal of deploying EV fast charging infrastructure to support the growing number of EVs and to help ensure that the transition to EVs is seamless for drivers. This coalition was formed in November 2021 by the Edison Electric Institute and consists of more than 60 investor-owned and municipal electric companies and electric cooperatives.<sup>40</sup>



<sup>39</sup> See USDOT Apportionment Notice dated February 10, 2022.

<sup>40</sup> <https://www.eei.org/en/issues-and-policy/national-electric-highway-coalition>

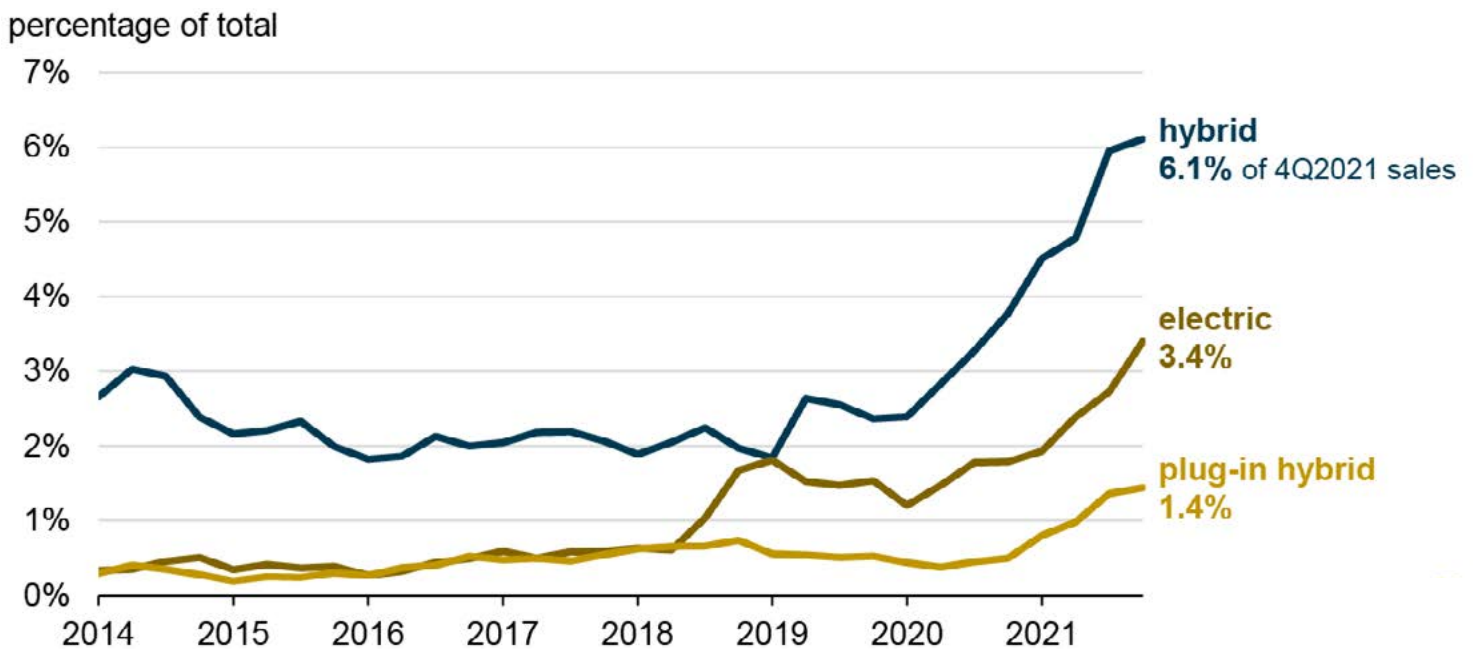
### EV Announcements and Trends Beyond SC

Political actions as well as reports and data statistics beyond SC reflect an increase in the rate of adoption of EVs.

- In 2021, the White House proposed a [target of 50% electric vehicle sales](#) share by 2030.<sup>41</sup>
- In December 2021, the EPA issued revised light-duty vehicle greenhouse gas emission [standards](#) for model years 2023 and beyond. The EPA estimates that rulemaking will get the US fleet back towards meeting the carbon emission reduction targets with an estimated EV penetration of 17% of the light-duty vehicle fleet by 2026.
- In February 2022, the Energy Information Administration (EIA), reported “hybrid, plug-in hybrid, and electric vehicle sales in the United States have increased in recent months as sales of non-hybrid internal combustion engine (ICE) vehicles fueled by gasoline or diesel decreased. In the fourth quarter of 2021,

hybrid, plug-in hybrid and electric vehicles collectively accounted for 11% of light-duty vehicle sales in the United States” as shown in Figure 11. In 2021, manufacturers increased the number of hybrid and EV models available by 126 while only increasing the number of ICE models by 49.<sup>42</sup>

Figure 10. Quarterly Light-Duty Vehicle Sales by Powertrain (2014-2021)<sup>43</sup>



41 2021: Another Chapter In The Global Race Towards Electrification; March 4, 2022; by: Peter Mock and Zifei Yang; <https://theicct.org/2021-global-race-evs-mar22/>,

42 Today in Energy, 02/09/2022, Electric vehicles and hybrids surpass 10% of U.S. light-duty vehicle sales, U.S. Energy Information Administration. <https://www.eia.gov/todayinenergy/detail.php?id=51218>.

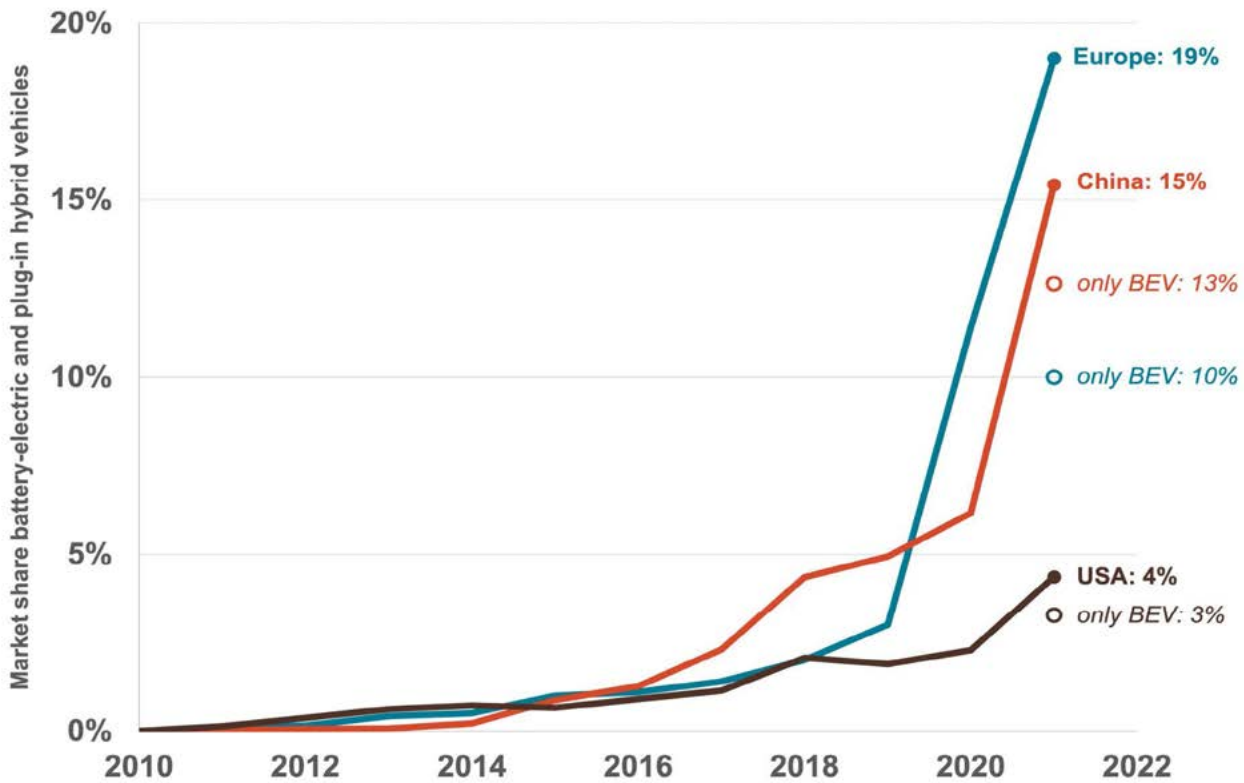
43 See footnote 42



- The US market share of EVs almost doubled in 2021, going from around 2% in 2020 to 4% in 2021, yet is lower than the rising market shares in Europe and China.<sup>44</sup> There are a multitude of contributing factors to this rate of transition to electrification in the US, some of which may include the rolling back of the [2021–2026 U.S. light-duty vehicle efficiency standards](#).<sup>45</sup>

In Figure 11 the historic ownership of electric and plug-in hybrid vehicle models globally as well as the predicted trends in these vehicles in comparison to all vehicle types is shown.<sup>46</sup>

**Figure 11. Historic Development of the Share of BEVs and PHEVs<sup>47</sup>**



According to the article by Mock and Yang, “[a]ll these developments relate to market shares only. In terms of absolute sales, China clearly remains in the lead, with more than 3 million electric cars newly registered in 2021, compared to 1.9 million in Europe.”<sup>48</sup>

<sup>44</sup> 2021: Another Chapter In The Global Race Towards Electrification; March 4, 2022; by: Peter Mock and Zifei Yang; <https://theicct.org/2021-global-race-evs-mar22/>, Data for China and the United States is taken from Marklines. Data for Europe is taken from the European Environmental Agency (EEA) and Dataforce. Data for China and Europe only includes passenger cars, while data for the United States also includes light trucks.

<sup>45</sup> See footnote 44

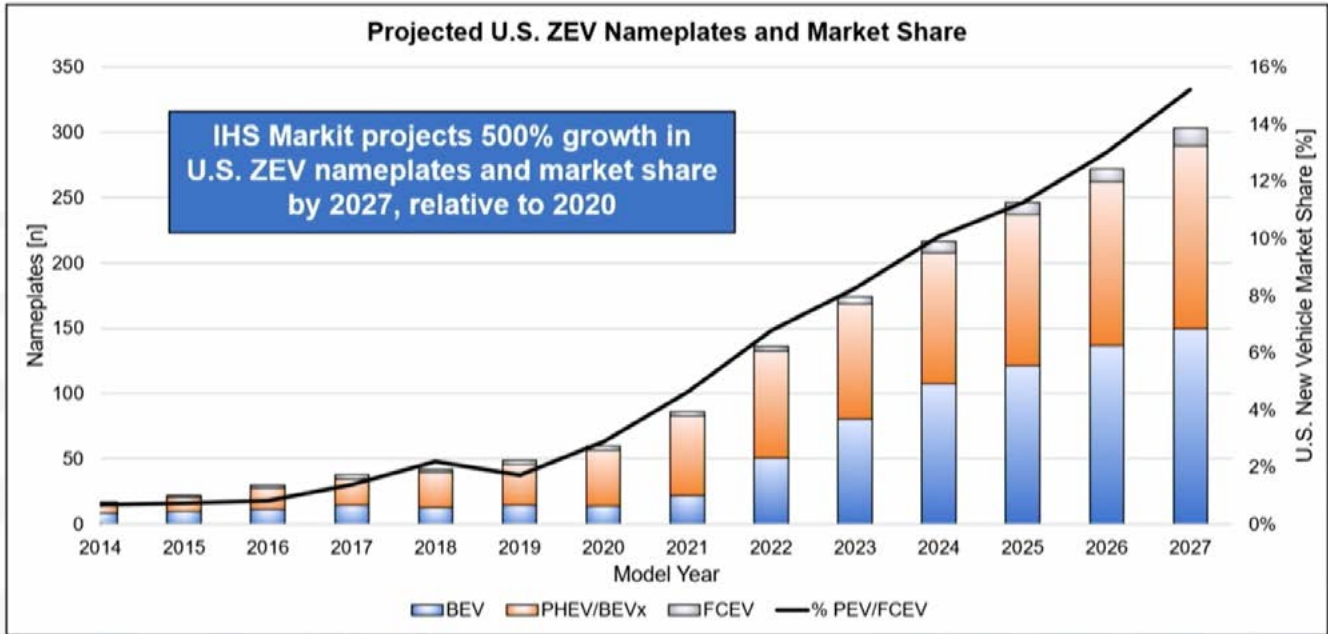
<sup>46</sup> See footnote 44

<sup>47</sup> See footnote 44

<sup>48</sup> See footnote 44

The anticipated growth of EV models and related market share in the United States is shown in Figure 12.<sup>49</sup>

**Figure 12. Anticipated Growth in US Zero Emission Vehicles (ZEV) Models and Market<sup>50</sup>**



Analysis for Figure 12 was prepared by the Alliance for Automotive Innovation based on content supplied by IHS Markit VPaC - Vehicle Performance and Compliance Monitor (October 2020) and Baseline Studies for Auto Innovators and presented on a slide during a presentation in an October 2021 SC Senate Finance Committee.

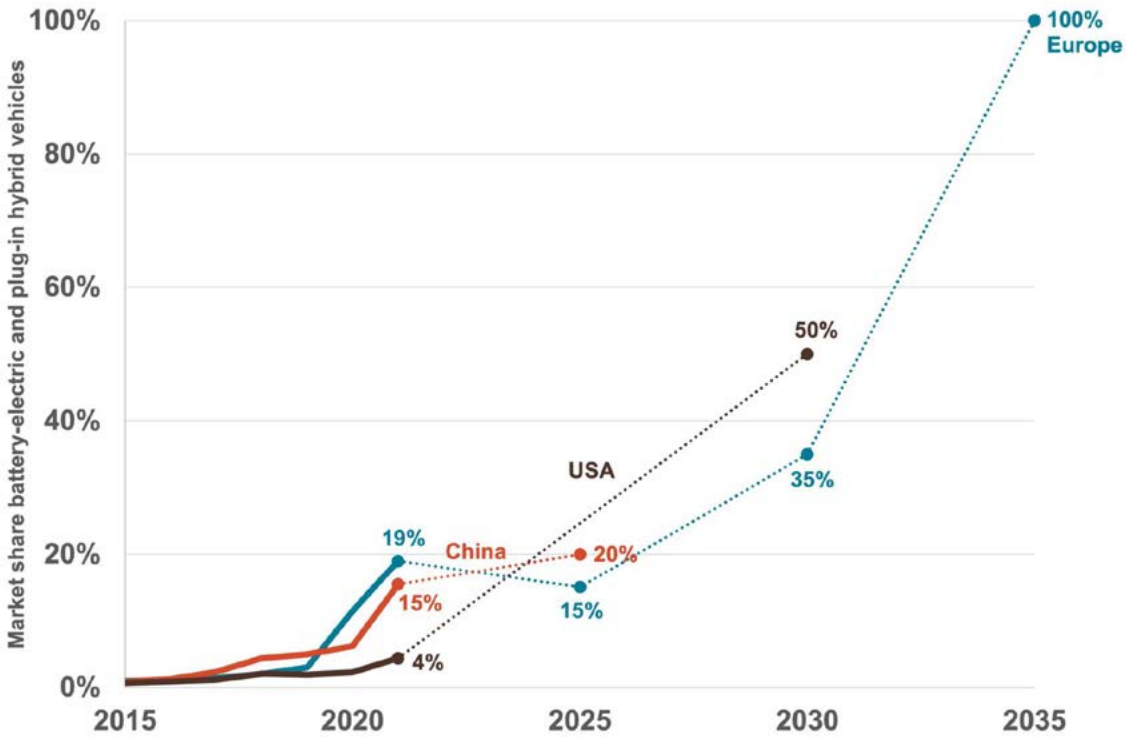


<sup>49</sup> Testimony by Leighton Yates with Alliance for Automotive Innovation on Wednesday, October 27, 2021 10:00 am, Senate Finance Committee -- Finance Subcommittee (slide at 43:29 in video recording).

<sup>50</sup> See footnote 49

According to a report titled, “2021: Another Chapter in the Global Race Towards Electrification,” Figure 13 shows the historic and projected market share of the US for battery and plug-in electric vehicles. Also this graph shows the how the US compares to global market share in Europe and China for both past years as well as projected.

**Figure 13. Forecast of the share of BEVs and PHEVs<sup>51</sup>**



<sup>51</sup> 2021: Another Chapter In The Global Race Towards Electrification; March 4, 2022; by: Peter Mock and Zifei Yang; <https://theicct.org/2021-global-race-evs-mar22/>, Data for China and the United States is taken from Marklines. Data for Europe is taken from the European Environmental Agency (EEA) and Dataforce. Data for China and Europe only includes passenger cars, while data for the United States also includes light trucks.



# PART FOUR

## CONCLUSION

This Report offers actionable recommendations for South Carolina. The recommendations reflect the discussions of voluntary stakeholder working groups, but not every recommendation reflects consensus.

The purpose of this Report is twofold: (1) to inform future Energy Office initiatives as part of the State Energy Plan and in accordance with the charge under Act 46 for the Office of Regulatory Staff to convene additional stakeholder initiatives and Report recommendations to the Joint Committee; and (2) to provide the Joint Committee with initial recommendations regarding the challenges and opportunities related to the electrification of the transportation sector.

## PROPOSED NEXT STEPS

This Report presents the most pressing opportunities and challenges related to the electrification of transportation as identified by collaborative, statewide stakeholder discussions. The 27 recommendations resulting from the five (5) Working Groups are not mutually exclusive, nor is there a single agency or entity equipped to implement them. A fair, efficient and cost-effective transition to electrification requires the concerted efforts of state and local leaders, public entities, private industry and the greater population as a whole.

Below is a proposed path forward, including implementation of recommendations (development of tools and resources, educational outreach) or frameworks for further discussion on this rapidly developing transition in the transportation sector. This proposed path forward serves as a guide as the Energy Office continues work on its statutory mandate to promote energy efficiency, renewable energy, and clean transportation. The Report is intended to inform future Energy Office initiatives as part of the State Energy Plan, complemented by the continuing Energy Office efforts to implement recommendations from previous energy planning efforts.

**Implementation of the recommendations may be pursued in the following manner:<sup>52</sup>**

**Statewide EV Awareness Effort (Energy Office Initiatives)**

**Statewide Public-Private Collaboration (Public-Private Collaboration)**

**Statewide Electrification Roadmap (Continued Collaboration)**

**Legislative Consideration and Actions**



<sup>52</sup> The number in parentheses references which specific Working Group recommendation is the basis for that proposed implementation. Some recommendations fall under multiple efforts.

# Statewide EV Awareness Effort

(Energy Office Initiatives)<sup>53</sup>

**Develop and fund a brand-agnostic EV awareness campaign for South Carolina (3), including some of the following components:**

## Education and Outreach to Public Entities:

- Develop a needs assessment/survey of public entities to determine fleet needs and challenges (23)
- Continue engaging utilities on options for public entities (27)

## Educate Public Entities Regarding:

- How fleet electrification and charging may effect their utility rates (23,27,8)
- Fleet electrification potential benefits of bi-directional charging in terms of resilience and revenue (8, 27)
- Available financial mechanisms to enable purchase of EVs and EV charging infrastructure<sup>54</sup> (20, 26)
- Best practices and model code ordinances to support EV infrastructure deployment (24)

## Create a Publicly Accessible, Online Resource Hub that Serves as a One-Stop Shop (5):

- Provide data and decision support tools and resources (25)
- Examples of model zoning and code ordinances to support EV infrastructure deployment (24)
- Available financing mechanisms (26)
- Tools for the value chain such as new business models and educational materials to ensure auto dealers, service stations and independent mechanics are informed proactively throughout this transition to electrification (2, 4)

## Public Outreach and Equity:

- Develop a process to reduce barriers to participation in EV decision-making, engage communities (7)
- Ensure EV programs benefit multi-unit dwellings and disadvantaged areas (18)
- Implement an “EV for Schools” program for Title I schools (10)

<sup>53</sup> Note that implementation of these proposed activities as State Energy Office initiatives are dependent upon available funding and staffing resources.

<sup>54</sup> Financial mechanisms may include grants, cooperative purchase agreements, GSA program for surplus vehicle transfer and tax credit transfers.

# Statewide Public-Private Collaboration

*(Public Entity and Private Industry Collaboration)*

This collaborative effort could provide an avenue to drill even further into the issues identified through the 2021 EV Stakeholder Initiative and allow for identification of solutions and development of useful tools and programs. A neutral statewide committee with working groups to facilitate continued honest conversations and increase education and awareness as the EV industry grows in South Carolina (1)

**EV Program and Rate Design Industry Committee Specifically Providing Factual Communication of Expert Information to the Statehouse, the PSC, and Others (15).<sup>55</sup>**

## **EV Workforce Development Plan:**

- Ensure the value chain (including auto dealers, service stations and independent mechanics) are informed proactively throughout this transition to electrification (4)
- Develop tools, such as an asset map, industry market survey, curriculum for EV professionals, options for EV-focused small businesses (2, 4)

## **Incentives and Financing:**

- Identify and share existing and new financing opportunities related to EVs and EV infrastructure<sup>56</sup> (19, 26)
- Engage utilities in accelerating transportation electrification by leveraging utilities' assets and capabilities through rebates, make-ready incentives, EV rates, investments in fleet electrification, and investing in vehicle-to-grid technologies (22)

<sup>55</sup> The industry committee may include fleets, original equipment manufacturers (OEMs), charging providers, utilities, community groups, etc. (15)

<sup>56</sup> Financing opportunities may also include rebates, tax incentives, utility-based incentives, and a green bank. (19)



# Statewide Electrification Roadmap

(Continued Collaboration)

Create a Statewide Electrification Roadmap that provides SC a plan for a competitive advantage advancing EV manufacturing/workforce development, EV infrastructure, and EV sales within the state. This document would include goals and targets for state agency, PSC and others involved in deployment of EVs and EV infrastructure and to set the stage for South Carolina's EV economic development.

## Develop voluntary minimum standards for EV charging infrastructure and design (16):

- Including Americans with Disabilities Act (ADA) compliance (6, 16)
- Technology flexibility, power levels, and safety/reliability elements to station design (16)
- Standardize signage (16)
- Consider consumer safety and reliability (16)

## Prioritize the deployment of EV infrastructure along critical corridors (17):

- Coordinate with and leverage SCDOT's efforts through the NEVI program to deploy EV infrastructure along federal highways
- Coordinate EV infrastructure planning efforts underway by other public and private entities (county and local governments, private sector, auto manufacturers)
- Encourage vehicle electrification in areas disproportionately impacted by vehicle-related health and noise impacts (11)

## Ensure passenger EV availability throughout SC (21):

- Determine feasibility of EV infrastructure implementation at existing and new low- and moderate-income dwellings (12)
- Ensure EV programs benefit multi-unit dwellings (MUDs) and encourage electrification in disadvantaged areas (18)
- Engage communities with insufficient EV accommodations to ensure EV investment decisions reasonably support and reflect the needs and desires of geographically, economically, and racially diverse communities (7)
- Promote existing and new financing opportunities related to EVs and EV infrastructure<sup>57</sup> (19, 26)

<sup>57</sup> Financing opportunities may also include rebates, tax incentives, utility-based incentives, and a green bank. (19)

# Legislative Consideration and Actions

Several stakeholder recommendations require legislative consideration and, in several cases, law and policy changes. The following issues may be addressed through the Legislature's leadership

## Equity/ Environmental Justice:

- Encourage vehicle electrification in areas disproportionately impacted by vehicle-related health and noise impacts (11)
- Ensure EV programs benefit multi-unit dwellings and encourage electrification in disadvantaged areas (18)
- Encourage feasible EV infrastructure implementation at existing and new low- and moderate-income dwelling (12)
- Develop a process to reduce barriers to participation in the EV decision-making process (7)

## Resilience:

- Enable the use of EV batteries for resilience purposes during emergencies and instances of sustained power outages (8)
- Encourage vehicle-to-grid and x-to-grid opportunities<sup>58</sup> (27)

## Accessibility:

- Support the adoption of e-bike implementation (9)
- Ensure EV charging incorporates requirements beyond minimum Americans with Disabilities Act (ADA), ("ADA plus") (6)
- Adopt voluntary minimum standards for EV chargers and station design (16)
- Ensure passenger EV availability throughout SC (21)

## Finance:

- Create incentives and financing mechanisms to reduce the upfront costs for consumers (19, 26)
- Expand the SC Alternative Fuel Infrastructure Tax Credit (14)
- Expand options for electrification of light, medium, and heavy-duty fleets (20)

## Planning:

- Develop a statewide committee to facilitate conversations, education, and awareness as we work together to build out the industry in SC (1)
- Fund development of an EV workforce development plan for the state (2)
- Fund development of a Statewide Electrification Roadmap (13)
- Enable planning and zoning mechanisms to create EV-ready communities (24)

<sup>58</sup> Vehicle-to-x is technology that enables energy to be pushed back to the power grid or other infrastructure from the battery of an electric car.

**Thank you to our stakeholders, including our Advisory Committee, for their tireless contributions over many months.**

**Over 350 individuals representing the sectors outlined below participated in meetings and working groups over the course of the initiative:**

- Energy Equity and Justice
- EV Charging Station Providers/Charging Networks
- EV Manufacturing and Supply Chain
- Fleets
- Government – local, state, regional, and federal
- Individuals – including EV drivers and owners
- Industry and Other Entities
- Non-Profit and Not-for-Profit
- Technical Colleges & Universities
- Utility

#### **Electric Vehicle Stakeholder Initiative Advisory Committee**

- SC Department of Administration, State Fleet Management
- SC Department of Commerce
- SC Department of Health and Environmental Control
- SC Department of Insurance
- SC Department of Transportation
- Clemson University - International Center for Automotive Research
- City of Greenville
- SC Association of Municipal Power Systems
- Duke Energy
- Electric Cooperatives of South Carolina
- Conservation Voters of South Carolina
- Southern Alliance for Clean Energy
- Chargepoint
- Proterra
- Volvo
- SC House of Representatives
- SC Senate

**Thanks also to the Duke University Nicholas Institute for Energy, Environment and Sustainability for facilitating the process.**



**CHARTING A NEW  
JOURNEY**



# APPENDICES

- ❖ **APPENDIX A: Stakeholder Process Details**
- ❖ **APPENDIX B: Notable State Activities – Full Summaries**
- ❖ **APPENDIX C: General Environmental Concerns**
- ❖ **APPENDIX D: EV Basics and Resources**

- 
- ❖ **APPENDIX A: Stakeholder Process Details**
    - **List of participating organizations**
    - **Stakeholder survey/feedback results**

## List of participating organizations

The following tables list the organizations that had representation during the EV Stakeholder Initiative. Not listed are independent individuals.

### Charging Station Provider/ Network

ABB Inc.  
Border States Electric Supply  
ChargePoint  
ClipperCreek, Inc  
Columbia Metropolitan Airport  
Electrify America  
EV Box  
EVGO  
FLO Services  
Gilbarco e-Mobility  
Greenlots  
Pine Shore Energy LLC  
Siemens eMobility  
Sunrun

### Energy Equity and Justice

Appleseed Legal Justice Center  
EV Noire  
Green For All  
Gullah Geechee Chamber of Commerce  
New Alpha CDC  
Sustaining Way  
The Imani Group, Inc.  
The Whitney M Slater Foundation

### Fleet

Benore Logistic Systems  
Interstate Transportation Equipment Inc.  
Shealy Truck Center  
Greenlink (Greenville Transit)

### Electric Vehicle Manufacturers and Supply Chain

Adomani  
Arrival  
Blanchard RIG360 Truck Center / Nikola  
Continental Tire Americas  
Daimler  
General Motors  
Kenworth Truck Company  
Lonestar Specialty Vehicles  
Lordstown Motors  
Proterra  
The Lion Electric Co.  
Thomas Built Buses  
Volvo Cars



Government	
Beaufort County - Planning; Public Works	Local
Berkeley County	Local
City of Charleston	Local
City of Columbia	Local
City of Columbia - Climate Protection Action Campaign	Local
City of Greenville - Sustainability; Public Works	Local
City of Myrtle Beach	Local
City of North Augusta	Local
City of Rock Hill - Public Works	Local
City of Simpsonville	Local
Columbia Housing	Local
Greenville County Planning	Local
Greenville County School Board	Local
Horry County Planning & Zoning	Local
Kiawah Island Community Association	Local
Spartanburg CSD #5	Local
Town of Hilton Head Island	Local
Town of Lexington	Local
Town of Salley	Local
Town of Summerville	Local
Appalachian Council of Governments	Regional
Berkeley-Charleston-Dorchester Council of Governments	Regional
Municipal Association of SC	Regional
Ten at the Top	Regional
Waccamaw Regional Council of Governments	Regional
NC Utilities Commission Public Staff	State
NC Department of Transportation (NCDOT)	State
SC Commission for Minority Affairs	State
SC Department of Administration	State
SC Department of Commerce	State
SC Department of Health and Environmental Control (SCDHEC)	State
SC Department of Insurance	State
SC Department of Motor Vehicles	State
SC Department of Parks, Recreation, & Tourism	State
SC Department of Revenue (SCDOR)	State
SC Department of Transportation (SCDOT)	State
SC House of Representatives; Labor, Commerce & Industry Committee	State
SC Housing	State
SC Office of Regulatory Staff (ORS), State Energy Office	State
SC Office of State Fleet (Management)	State
SC Senate, PURC staff	State
SC State Ports Authority (SCSPA)	State
SC Technical College System	State
Fort Jackson	Federal

### Non-Profit/Not-for-Profit

AARP SC  
AIA South Carolina  
Alliance for Transportation Electrification (ATE)  
American Lung Association  
Amputee In Action  
Audubon South Carolina  
Carolinas Alliance 4 Innovation/Carolina RIDES+  
Center for Transportation and the Environment  
Conservation Voters of South Carolina  
E4 Carolinas  
Electrification Coalition  
Energy Foundation  
Greater Indiana Clean Cities  
Justice James Consulting  
League of Women Voters of SC  
National Governors Association  
Plug-in America  
Regulatory Assistance Project (RAP)  
SC Climate Change  
SC Coalition for Mathematics & Science  
SC Coastal Conservation League  
SC Council on Competitiveness  
SC Health Professionals for Climate Action  
SC Logistics  
SCADA  
Sierra Club  
SmartPower  
Southeast Energy Efficiency Alliance (SEEA)  
Southeast Rural Community Assistance Project (SERCAP)  
Southern Alliance for Clean Energy (SACE)  
Southern Environmental Law Center (SELC)  
Sun City Environmental Action Group  
Sustainable Midlands  
Tesla Owner's Club - Columbia, SC/ Drive Electric Columbia  
The Ray  
Upstate Forever  
Upstate Mobility Alliance  
US Green Building Council (USGBC)  
VEIC  
World Resources Institute (WRI)

### Technical Colleges and Universities

Clemson University  
College of Charleston  
Duke University Energy Initiative  
Greenville Technical College  
Medical University of South Carolina  
University of South Carolina

### Utility

Aiken Electric Cooperative  
Berkeley Electric Cooperative  
Black River Electric Cooperative, Inc.  
Blue Ridge Electric Cooperative, Inc.  
Central Electric Power Cooperative, Inc.  
Dominion Energy South Carolina  
Duke Energy Corporation  
Edisto Electric Cooperative  
Electric Cooperatives of SC  
Laurens Electric Cooperative, Inc.  
Lockhart Power Company  
Lynches River Electric Cooperative  
Palmetto Electric Cooperative  
Pee Dee Electric Cooperative  
Santee Cooper  
Santee Electric Cooperative  
Tri-County Electric Cooperative, Inc.  
York Electric Cooperative

## Other

1944

Building Industry Association

CBRE Advisory & Transaction Services

Clemson University International Center for Automotive Research (CU-ICAR)

Colite

Consultant for non-profit

Cooper Consulting

Edelman

Forward CC

Fox Energy Innovations, LLC

gdsassociates

Griggs

Kendig Keast Collaborative

LS3P Associates Architects

Mercury Assoc

Michael P. Criss, AICP, LEED AP, LLC

Mullikin Law

NATSO

P3 USA

Phil Jones Consulting LLC

RaceTrac

SC Biz News

SC Manufacturers Alliance

SC Research Authority

SC Restaurant and Lodging Association

Schneider Electric

Seawall EV

socopower

Sparrow Optics

Spartanburg Area Regional Transit Agency

Timberlake Communications, LLC

TKJ Inc.

TxE TRA

UEC Electronics, LLC

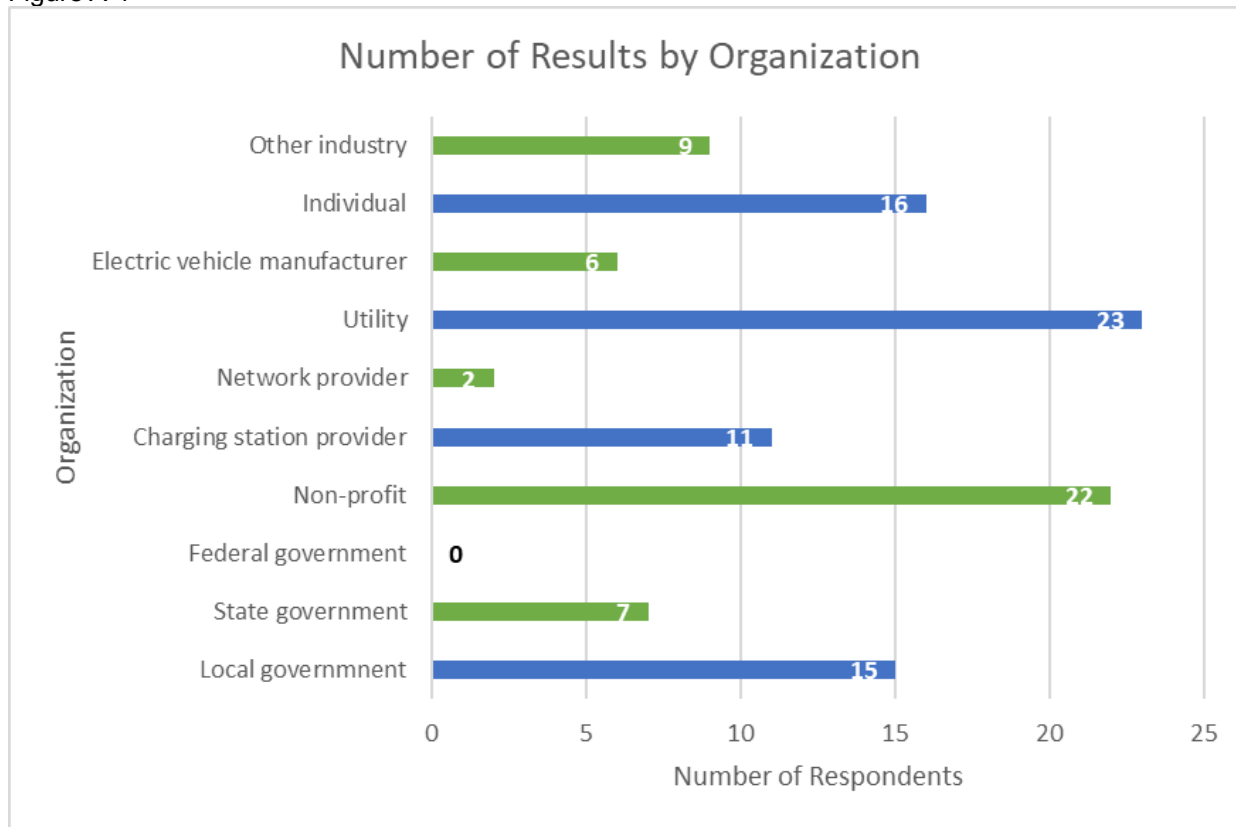
W.A.T.E.R (Water for Aiken Through Environmental Reform)



### Stakeholder Survey (May 2020)

The SC Energy Office distributed an online Electric Vehicle Stakeholder Survey in May 2020 to gather information on a variety of topics related to electrification. The survey was distributed by the SC Energy Office, and 111 stakeholders responded. Survey results are provided below.

Figure A-1



Organizations participating in the survey are displayed in Figure A-1. Utilities were the majority of respondents followed by non-profit, individuals, and local government

Figure A-2

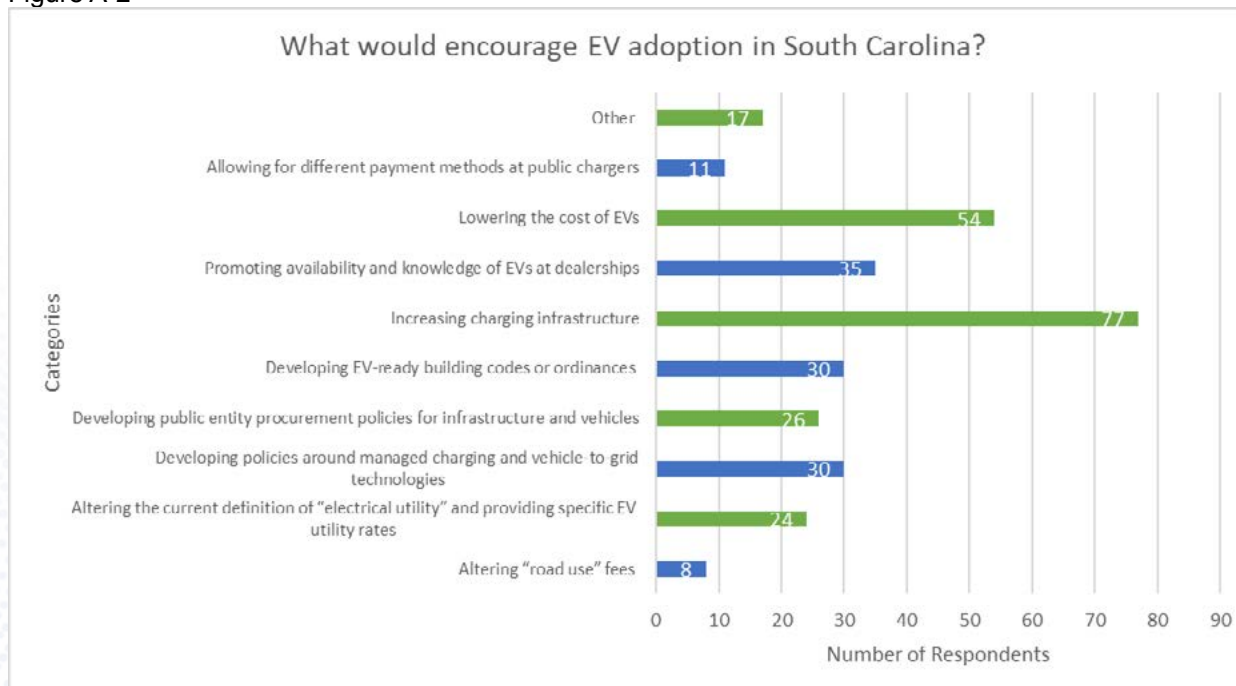


Figure-2 covers actions to encourage EV adoption. Respondent results indicate that increasing infrastructure, lowering EV costs, and promoting availability and knowledge of EVs at dealerships as the top three factors that will encourage adoption on South Carolina.

Figure A-3

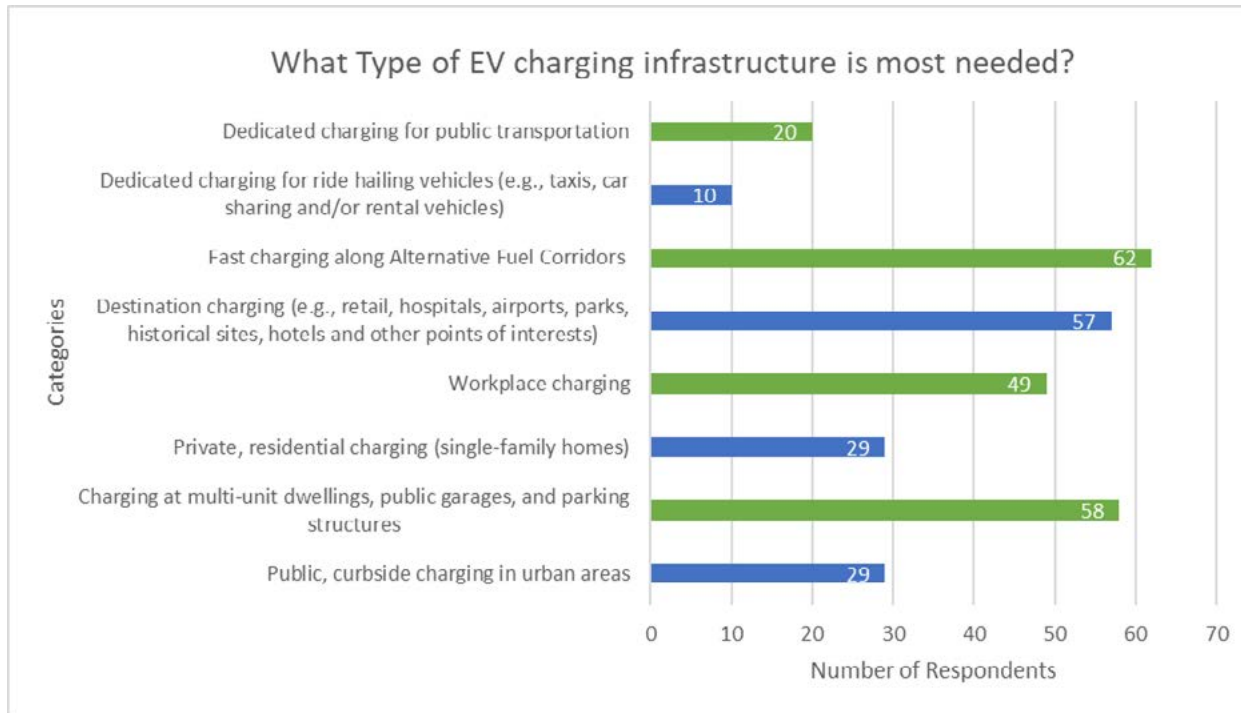


Figure A-3 covers needed infrastructure. Respondents indicated fast charging along alternative fuel corridors, charging at multi-use developments and public charging, and destination charging as the top three infrastructure needs.

Figure A-4

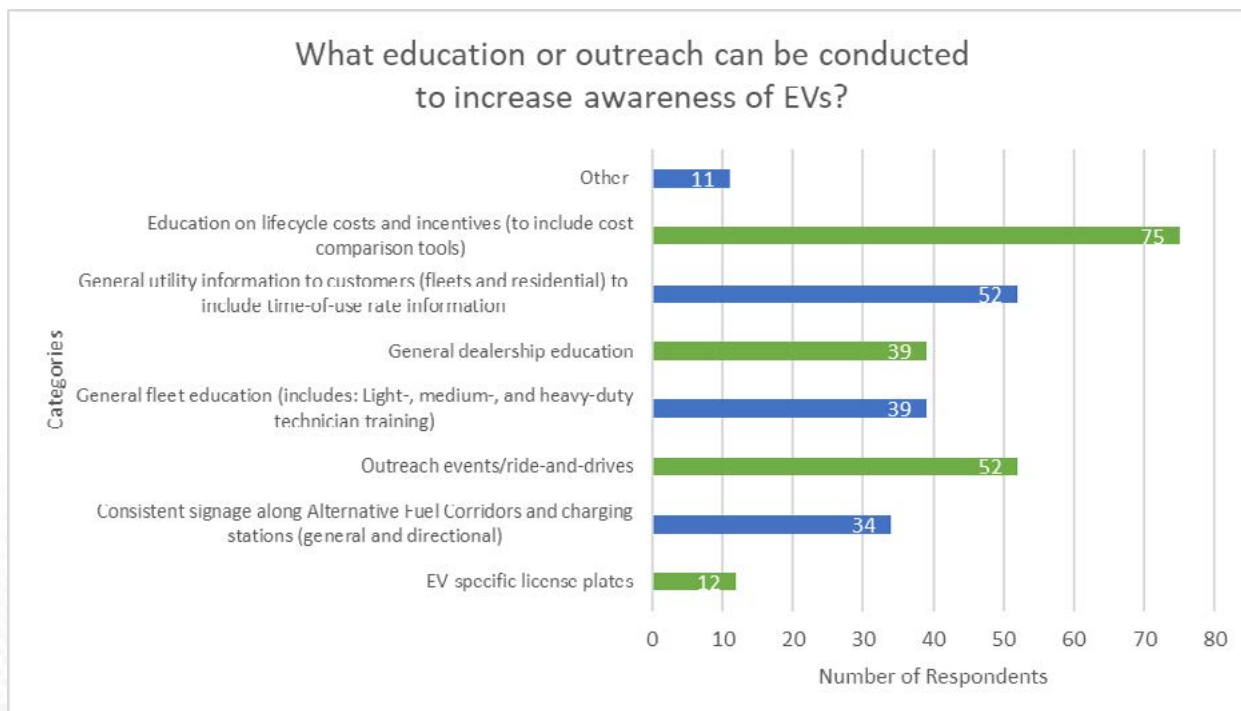


Figure A-4 covers education and outreach needs. Respondents indicated education on lifecycle costs and incentives, Utility information to consumers, and ride-and-drives as the top three education and outreach needs.

Figure A-5

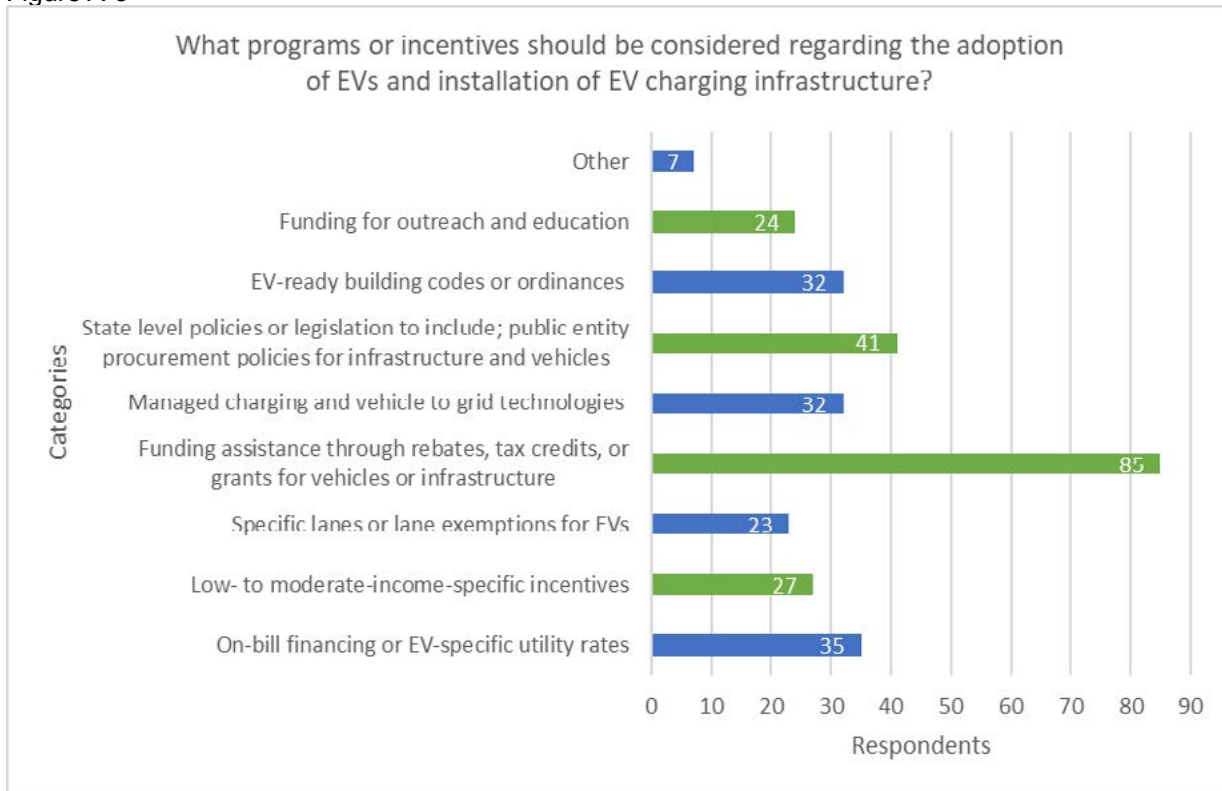


Figure A-5 covers EV programs and incentives. Respondents indicated tax rebates, credits, or grants; state level policies or legislation, and on-bill financing or EV specific utility rates as the top three program and incentives to consider.

The survey also included an open-ended question (What are some possible consumer protection or complaint issues EV customers may have?). Responses are below:

- Possible EV damage due to an improper/malfunctioning charger
- Clear messaging about EV options at dealerships (DCFC option)
- Runaway charging costs when unknowingly charging during peak hours
- Charging fee consistency
- Identifying proper electric vehicle technicians
- Arriving to stations that are broken
- Not enough choices of vehicles on dealerships' lots in SC



On October 28, 2021, a virtual workshop was held presenting the recommendations that came from the five (5) working groups. At the end of the workshop, participants were invited to provide feedback on the process as well as provide any items they felt may not have been addressed already.

Figure A-6

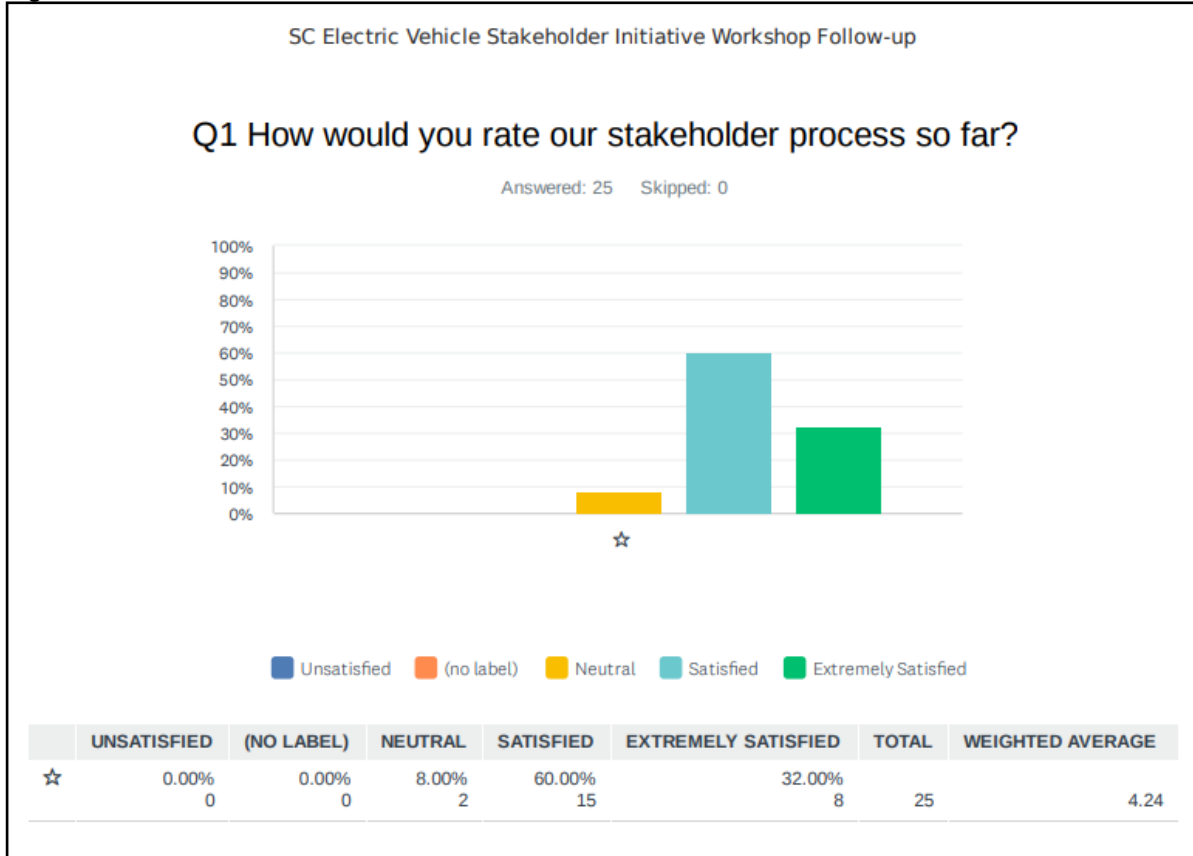


Figure A-6 displays the responses from 25 participants on the stakeholder process.

Based on the responses in Figure A-6 participants were overwhelming satisfied with the EV stakeholder initiative process.

Additionally, participants were asked to provide input on the type of funding that should be used for any incentives that might become available during the EV transition. Figure A-7 displays those responses.

Figure A-7



Respondents most often selected private industry as the primary funder of incentives most closely followed by EV customers.



❖ **APPENDIX B: Notable State Activities – Full Summaries**

In addition to the EV Stakeholder Initiative outlined in this report, numerous other EV-related activities have taken place in the state that warrant noting here. Descriptions of each have been adapted from their corresponding websites or news sources.

### **ChargeSC EV Working Group**

SC Council on Competitiveness (SC Competes)

ChargeSC, an initiative of SC Competes, will take a collaborative approach, partnership with public, private, academic, and nonprofit sectors to connect the state's assets to generate awareness about electric vehicles and promote adoption of e-Mobility vehicles, accelerate a robust electric charging infrastructure, and advance policies and incentives to make electric transportation an attractive and cost-effective option for drivers, moving toward a sustainable transportation ecosystem for SC.

The goal of the ChargeSC EV Working Group is to identify the issues and opportunities around e-mobility in our state, including:

- (1) Needs of medium and heavy trucking electrification,
- (2) Infrastructure needs, and
- (3) What policy/incentives would kickstart efforts?

### **Charging Ahead Webinar Series**

SC Automotive Council of the SC Manufacturers Alliance

This webinar series is available to statewide stakeholders and covers various aspects of the electrification of the automotive industry. Attendees will hear unique perspectives of representatives from our state's utilities, automotive manufacturers, academic community, state agencies, and more.

### **Joint Committee on the Electrification of Transportation**

SC General Assembly

Per Act 46, this Joint Legislative Committee will:

- (1) Examine legislative and regulatory, environmental, economic, and customer challenges and opportunities
- (2) Identify challenges and opportunities in EV technologies, including power conversion and energy storage; grid integration of electrified transportation; transportation policies "that pave the way for electrified transportation"
- (3) Identify efforts to enable a more efficient and cost-effective transition to electric transportation

### **Critical Transportation Infrastructure Funding Modernization Subcommittee**

SC General Assembly – Senate Finance Committee held a meeting on October 27, 2021, to discuss the electrification of transportation that included testimony by SC Manufacturers Alliance, SC Automotive Council & Electric Cooperatives of SC.

### **Collaborative Research: REVVED - Revolutionizing Electric Vehicle Education)<sup>1</sup>**

A SC consortium comprised of Trident Technical College, in partnership with Greenville Technical College, Spartanburg Community College, and Clemson University, are collaborating to conduct evidence-based research studies to investigate integration of virtual and augmented reality systems to support electric vehicle manufacturing and education. Several workforce development centers and industry partners including BMW, Michelin, Bosch, Daimler, Proterra and Volvo are also involved.

The consortium is receiving \$2.83 million from the National Science Foundation to fund the project. The need to develop a workforce that can build and service electric and autonomous vehicles and develop the cybersecurity to protect them is the driving force behind this new consortium based in South Carolina. The digital learning tools will be based on industry needs and be available at [EducateWorkforce.com](https://www.EducateWorkforce.com).

One of the main goals is to strengthen learning and retention among students from rural areas, veterans and students who are from groups underrepresented in the workforce. Digital learning systems are especially attractive for students who are non-traditional and underrepresented in the workforce, researchers said.

SC Electric Transportation Network

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<sup>1</sup> [https://news.clemson.edu/revved-consortium/?utm\\_medium=email](https://news.clemson.edu/revved-consortium/?utm_medium=email)



### **Conservation Voters of South Carolina**

The SC Electric Transportation Network connects others involved with and supportive of Electric Transportation in South Carolina for networking, collaboration, technical assistance, and updates. Joining is free. Network members will have the option to be included in a directory, opt into a listserv for collaboration, and are invited to monthly Zoom networking and update calls.

The Network's first call was held Thursday, May 19, 2022, via Zoom, with subsequent meetings in June and July. These meetings have consisted of presentations from various relevant stakeholders as well as updates on the status of IIJA funding for transportation electrification. This network is hosted by the Conservation Voters of SC.

### **State Fleet Electrification Cohort - Electrification Coalition**

Electrification Coalition's State Fleet Electrification Cohort has been formed with the intent of assisting fleets with overcoming challenges to transitioning their fleets to EVs. They have invited South Carolina, along with Maryland, New Mexico, Illinois, Massachusetts, and Wisconsin to participate. Public fleets from throughout the state have been invited to participate, including State Fleet Management, City of Greenville, Medical University of South Carolina, Charleston County, City of Charleston, and College of Charleston. Meetings are being held throughout 2022 in an effort to engage these stakeholders in this initiative, as it will serve as both an information exchange among these states as well as provide exposure to tools that fleets can use to assist with decision making.

### **Other Statewide EV-related Activity/Planning/Discussions**

In addition to the above initiatives outlined, numerous ongoing EV-related activities continue to take place throughout the state.

### **SC Energy Office EV-Related Activities and Initiatives**

#### **First EV Purchased by a State Agency**

Using its funding from the US Department of Energy State Energy Program (SEP) funds, in 2020 the Energy Office was able to take a significant step in clean transportation, purchasing the first state fleet electric vehicle (EV) for a state agency within South Carolina.

In 2016, the South Carolina State Energy Plan included a "Lead by Example" recommendation striving to increase transportation fuel efficiency and diversity, with the ultimate goal of reducing dependence on foreign oil and increasing the state's resilience. Toward that end, the Energy Office completed an extensive evaluation of the agency's existing vehicle and collaborated with state procurement officials to purchase a 2020 Chevrolet Bolt EV in March of 2020. As this is the first EV purchased by a state agency in South Carolina, the Energy Office is using it as a case study to encourage further adoption of alternative fuel vehicles in the state's fleet. To help other state agencies navigate the procurement process, the Energy Office has developed a procurement guide and additional informational resources to assist in evaluating EVs as an option.



#### **Partnership with SC Department of Parks, Recreation and Tourism (SCPRT)**

The Energy Office also used SEP funds to partner with the SC Department of Parks, Recreation and Tourism (SCPRT) to purchase and install EV charging stations at three state parks. Each park is strategically located near interstates or city centers to help facilitate EV travel across the state. These charging stations have the potential to impact over 1.23 million visitors across the three state parks on an annual basis. Since the successful installation in spring of 2020, SCPRT has been monitoring the usage of each charging station. This data will be used to inform the state's broader efforts in tracking EV usage and identifying EV charging station deployment opportunities and needs.

### **Plug in SC – EV Signage Campaign**

In September 2020, Palmetto Clean Fuels, US Department of Energy-recognized Clean Fuels coalition and an initiative of the Energy Office, launched the Plug in SC Incentive Program to support the adoption of standardized EV charging station signage and branding throughout the state. Through this program, qualifying participants receive EV signage free of charge, so that their charging stations are easily identifiable and provide a uniform user experience across the state. The program continues to garner success, with a total of 87 signs having been installed at various EV charging stations across the state. All of South Carolina’s publicly accessible EV charging stations are eligible to participate in the program.

### **SC Energy Office Mini-Grant Program**

Every year the SC Energy Office offers competitive Mini-Grant funds for a small number of highly visible demonstration projects which are intended to promote awareness of emerging technologies or innovative approaches to energy challenges. Projects are funded in the fields of energy efficiency, renewable energy, and clean transportation (which can include EV purchases & EV charging station installations). The program is open to SC government entities including state agencies, local governments, public colleges & universities and public school districts, as well as non-profit organizations. Individual applications are eligible to receive up to \$10,000 in grant funds, which are provided through the US Department of Energy’s State Energy Program. Past recipients using funding for EVs and EV charging infrastructure include the City of Rock Hill, Benedict College, Beaufort County.

### **Alternative Fuel Corridor Designations**

In July 2016, the US Department of Transportation Federal Highway Administration (FHWA) called on states to nominate alternative fuel corridors – i.e., electric vehicle charging and hydrogen, propane, and natural gas fueling corridors along major roadways as a part of the “Fixing America’s Surface Transportation” (FAST) Act (Title 23, United States Code, Section 151). Palmetto Clean Fuels coalition, an initiative of the SC Energy Office and a US DOE-designated Clean Cities coalition, has served as the point of contact for the state of South Carolina for all previous Alternative Fuel Corridor (AFC) designations. Through the PCF’s initial nomination of Alternative Fuel Corridors in 2016, SC became one of the first states to obtain AFC designation and to deploy signage along its roadways. Since that time, PCF has sought to work with stakeholders to identify major gaps in the alternative fuels network. The nominations have been broadly informed by stakeholder input, including from the SC Department of Transportation.

The Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act, amended Section 151 to update the requirements related to the designation of national alternative fueling corridors. The nomination/designation process of Alternative Fuel Corridors has grown in significance because it is now tied to funding eligibility provisions under BIL. The BIL establishes the National Electric Vehicle Infrastructure (NEVI) Formula Program, and a Discretionary Grant Program for Charging and Fueling Infrastructure.

The FHWA, with a team that included the VOLPE Center and the Joint Office of Energy and Transportation, reviewed and evaluated the nominations and corridors based on the criteria required in the Request for Nominations Memorandum, dated February 10, 2022. Nominations were due to the Federal Highway Administration on May 13, 2022.

### **SC Department of Transportation (DOT)**

The DOT is responsible for the adoption and implementation of the NEVI Formula Program. A plan that was created with consultation with the Energy Office of the SC ORS and the SC Division of the Federal Highway Administration (FHWA\_SC) was submitted to the Federal program on August 1, 2022.

According to the submitted plan, South Carolina will prioritize placement of passenger call electric vehicle (EV) charging equipment along the interstate highway system to complement completion of the national network. Initial emphasis will be placed on rural sections of the interstate where lack of urban facilities makes it less feasible for investments from the private sector. Public outreach and stakeholder engagement will occur to identify fair, equitable, and contextually appropriate locations for the equipment.

**Duke Energy ET Pilot**

In 2019, the SC Office of Regulatory Staff (ORS) held a stakeholder meeting to discuss Duke Energy Carolinas' and Duke Energy Progress' applications filed with the Public Service Commission of South Carolina for an ET pilot project (Application for Approval of Proposed Electric Transportation Pilot and an Accounting Order to Defer Capital and Operating Expenses, <https://dms.psc.sc.gov/Web/Dockets/Detail/116874> and <https://dms.psc.sc.gov/Web/Dockets/Detail/116875>). While the stakeholder meeting focused on Duke Energy's regulatory applications, there was collective support among stakeholders for continued discussions on statewide electrification outside the scope of the applications. The EV Stakeholder Initiative provided a process and forum for the statewide discussion.





❖ **APPENDIX C: General Environmental Concerns**

During the EV Stakeholder Initiative process, at times general environmental concerns were brought up. While this section will not provide an in-depth response, the reader will be provided some information as well as links to resources to review in more detail.

It is important to take health and environment impacts under consideration with such a significant change to transportation in South Carolina. Some of the common concerns are covered on the EPA's website (<https://www.epa.gov/greenvehicles/electric-vehicle-myths>) and three are shared directly from the website here (as of 8/24/2022):

myth

**Electric vehicles are worse for the climate than gasoline cars because of the power plant emissions.**



fact

**Electric vehicles typically have a smaller carbon footprint than gasoline cars, even when accounting for the electricity used for charging.**

Electric vehicles (EVs) have no tailpipe emissions. Generating the electricity used to charge EVs, however, may create carbon pollution. The amount varies widely based on how local power is generated, e.g., using coal or natural gas, which emit carbon pollution, versus renewable resources like wind or solar, which do not. Even accounting for these electricity emissions, research shows that an EV is typically responsible for lower levels of greenhouse gases (GHGs) than an average new gasoline car. To the extent that more renewable energy sources like wind and solar are used to generate electricity, the total GHGs associated with EVs could be even lower. (In 2020, renewables became the second-most prevalent U.S. electricity source.<sup>1</sup>) Learn more about electricity production in your area by visiting [EPA's Power Profiler interactive](#) web page. By simply inputting your zip code, you can find the energy mix in your region.

EPA and DOE's [Beyond Tailpipe Emissions Calculator](#) can help you estimate the greenhouse gas emissions associated with charging and driving an EV or a plug-in hybrid electric vehicle (PHEV) where you live. You can select an EV or PHEV model and type in your zip code to see the CO<sub>2</sub> emissions and how they stack up against those associated with a gasoline car.

myth

**Electric vehicles are worse for the climate than gasoline cars because of the power plant emissions.**



fact

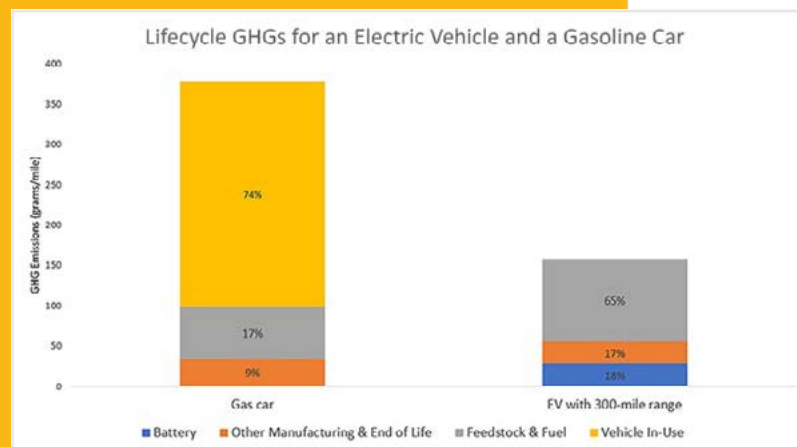
**The greenhouse gas emissions associated with an electric vehicle over its lifetime are typically lower than those from an average gasoline-powered vehicle, even when accounting for manufacturing**

Some studies have shown that making a typical electric vehicle (EV) can create more carbon pollution than making a gasoline car. This is because of the additional energy required to manufacture an EV's battery. Still, over the lifetime of the vehicle, total greenhouse gas (GHG) emissions associated with manufacturing, charging, and driving an EV are typically lower than the total GHGs associated with a gasoline car. That's because EVs have zero tailpipe emissions and are typically responsible for significantly fewer GHGs during operation (see Myth 1 above).

For example, researchers at Argonne National Laboratory estimated emissions for both a gasoline car and an EV with a 300-mile electric range. In their estimates, while GHG emissions from EV manufacturing and end-of-life are higher (shown in orange below), total GHGs for the EV are still lower than those for the gasoline car.

Estimates shown<sup>6</sup> from GREET 2 2021 are intended to be illustrative only. Estimates represent model year 2020. Emissions will vary based on assumptions about the specific vehicles being compared, EV battery size and chemistry, vehicle lifetimes, and the electricity grid used to recharge the EV, among other factors.

Above, the blue bar represents emissions associated with the battery. The orange bars encompass the rest of the vehicle manufacturing (e.g., extracting materials, manufacturing and assembling other parts, and vehicle assembly) and end-of-life (recycling or disposal). The gray bars represent upstream emissions associated with producing gasoline or electricity (U.S. mix), and the yellow bar shows tailpipe emissions during vehicle operations.





Recycling EV batteries can reduce the emissions associated with making an EV by reducing the need for new materials. While some challenges exist today, research is ongoing to improve the process and rate of EV battery recycling. For more information on EV battery development and recycling, visit:

- U.S. Department of [Energy's ReCell Center](#)
- [National Blueprint for Lithium Batteries, 2021-2030 \(pdf\)](#) (June 2021, report published by the Federal Consortium for Advanced Batteries)

myth

**Electric vehicles are not as safe as comparable gasoline vehicles.**



fact

**Electric vehicles must meet the same safety standards as conventional vehicles.**

All light duty cars and trucks sold in the United States must meet the [Federal Motor Vehicle Safety Standards](#). To meet these standards, vehicles must undergo an extensive, long-established testing process, regardless of whether the vehicle operates on gasoline or electricity. Separately, EV battery packs must meet their own testing standards. Moreover, EVs are designed with additional safety features that shut down the electrical system when they detect a collision or short circuit.

For more information, visit [DOE's Alternative Fuel Data Center](#)

In following the information from the EPA's website, below are some links from the National Renewable Energy Laboratory (NREL) on battery life and re-use for electric vehicles:

Battery Lifespan and Battery Lifetime analysis and Simulation Tools (BLAST)

<https://www.nrel.gov/transportation/battery-lifespan.html>

Battery Reuse and Recycling

<https://www.nrel.gov/storage/battery-reuse-recycling.html>

To better understand the evolving battery market, NREL researchers developed the Lithium-Ion Battery Resource Assessment (LIBRA) model.

Battery Second Use for Plug-In Electric Vehicles Analysis

<https://www.nrel.gov/transportation/battery-second-use-analysis.html>

Environmental research around electric vehicles and the raw materials used to make & power them is on-going with frequent new developments. While not included in this appendix due to the limited focus of the stakeholder initiative, an internet search may provide many articles on these subjects.



## **APPENDIX D: EV Basics and Resources**

- o **EV Basics**
- o **Resources by topic area**



## EV Basics and Resources

Appendix D contains a short introduction or '101' on EVs as well as numerous links to resources about EVs including maps to locate charging stations, planning tools, and other information as related to the working groups.

### EV Basics

- **Introduction to EVs**

Cars can be powered in several different ways, from gasoline to electric batteries and a spectrum of choices in between.

#### Vehicle Basics

### Conventional Gas Cars

Conventional vehicles use an internal combustion engine fueled by gasoline or diesel to power the wheels. Electricity is used for some accessories but is not used to move the vehicle.

**POWERED BY: GAS ENGINE**

**BATTERY TRAVEL: NONE**

**FUEL SOURCE: GAS**



### Conventional Hybrid Cars

Conventional hybrids, also referred to as hybrid electric vehicles (HEVs), supplement the internal combustion engine with electrical power produced by an on-board electric motor. The electrical system acts as a generator when a driver applies the brakes, converting kinetic energy into electrical energy that is stored in a small battery pack. The primary fuel is gasoline or diesel.

**POWERED BY: GAS ENGINE & ELECTRIC MOTOR**

**BATTERY TRAVEL: SHORT DISTANCE**

**FUEL SOURCE: GAS**



### Plug-In Hybrid Cars

A plug-in hybrid, also called a Plug-In Hybrid Vehicle (PHEV) or an Extended Range Electric Vehicle (EREV), has a larger battery than a conventional hybrid car, and is charged by plugging into an electric outlet. Plug-in hybrids also keep a gasoline or diesel engine as a backup. After the battery energy is exhausted, the engine starts, and the vehicle acts like a conventional hybrid until it is plugged in to recharge.

**POWERED BY: ELECTRIC MOTOR & GAS ENGINE**

**BATTERY TRAVEL: MEDIUM DISTANCE**

**FUEL SOURCE: ELECTRICITY & GAS**



### Battery Operated Cars

A battery-powered car, or Battery Electric Vehicle (BEV), does not have a gasoline or diesel engine and instead has an electric motor, power electronics, and a battery pack. Battery cars have a longer all-electric range than a plug-in hybrid, but they do not have a fuel backup. Just like a plug-in hybrid, battery-powered cars plug into an electric outlet to refuel.

**POWERED BY: ELECTRIC MOTOR**

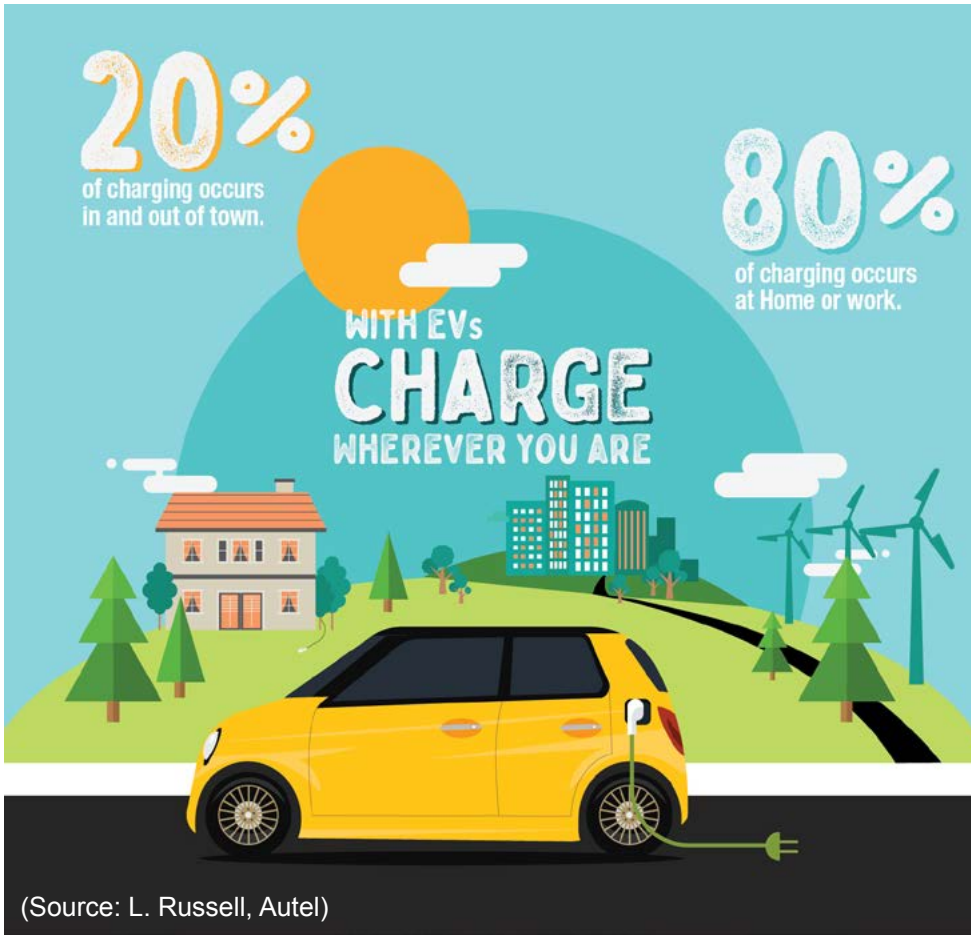
**BATTERY TRAVEL: LONG DISTANCE**

**FUEL SOURCE: ELECTRICITY**



(Source: <https://www.nyserda.ny.gov/All-Programs/Drive-Clean-Rebate/About-Electric-Cars/Types-of-Cars>)

# Charging Basics





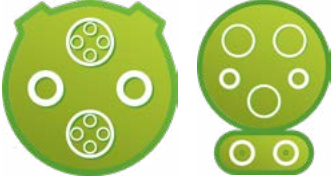
## How Long Does it Take to Charge an EV?

Typical time to fill up an 80-mile battery by charging type



(Source: Boston; chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.boston.gov/sites/default/files/file/2020/06/How%20To%20Install%20an%20EVSE%20.pdf)

\*DC fast charging can get many EV batteries charged to 80% in 20-30 minutes

	LEVEL OF CHARGING		
	LEVEL 1	LEVEL 2	LEVEL 3/ DC FAST CHARGING
VOLTAGE AND POWER SPECIFICATIONS	120V/20A outlet with dedicated circuit (standard wall outlet)	208/240V / 40A service with dedicated circuit (similar amount of energy required for a dryer plug)	240V or 480V AC 24kW -350kW+ Needs dedicated transformers and electrical service.
RATE OF CHARGING PER HOUR	SLOW: Can fully recharge a battery in 8-12 hours, though larger batteries may require 1-2 days	FASTER: Can fully recharge a car in 4-8 hours	FASTEST: Can recharge a battery to 80% capacity in 30 minutes
WALL OUTLET OR CONNECTOR	J1772 connected to standard wall outlet 	J1772 connector* 	CCS Combo(L), CHAdeMO(R)* 
TYPICAL LOCATIONS	Residential or office buildings with assigned parking stalls. Sufficient for overnight parking	Residential or office buildings with unassigned parking stalls. Well suited for indoor, or outdoor locations	Settings where people park for short durations, such as commercial properties or businesses

\*Tesla has a separate charging network

(Source: [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.boston.gov/sites/default/files/file/2020/06/How%20To%20Install%20an%20EVSE%20.pdf](https://www.boston.gov/sites/default/files/file/2020/06/How%20To%20Install%20an%20EVSE%20.pdf))



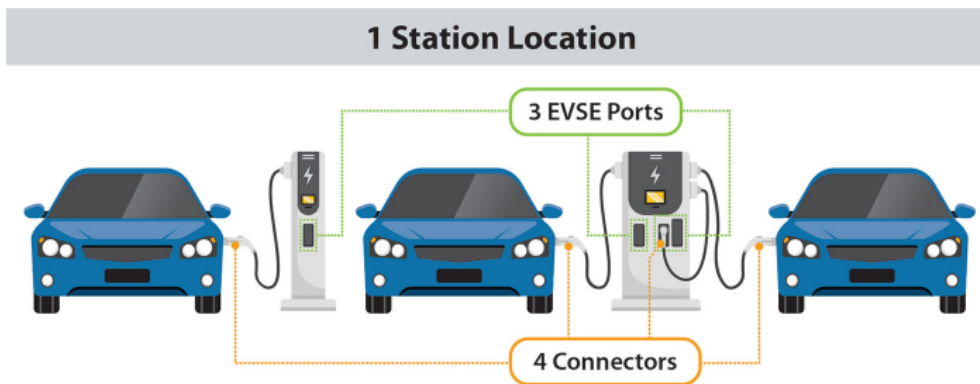
# Charging Infrastructure Terminology

The Alternative Fuels Data Center uses the following charging infrastructure definitions for Station Location Electric Vehicle Supply Equipment (EVSE) Port and Connector.

## Charging Infrastructure Terminology

The Alternative Fueling Station Locator uses the following charging infrastructure definitions:

- **Station Location:** A station location is a site with one or more EVSE ports at the same address. Examples include a parking garage or a mall parking lot.
- **EVSE Port:** An EVSE port provides power to charge only one vehicle at a time even though it may have multiple connectors. The unit that houses EVSE ports is sometimes called a charging post, which can have one or more EVSE ports.
- **Connector:** A connector is what is plugged into a vehicle to charge it. Multiple connectors and connector types (such as CHAdeMO and CCS) can be available on one EVSE port, but only one vehicle will charge at a time. Connectors are sometimes called plugs.



(Source: [https://afdc.energy.gov/stations/#/analyze?region=US-SC&country=US&access=public&access=private&fuel=ELEC&ipg\\_secondary=true&hy\\_nonretail=true&ev\\_levels=all&show\\_ev\\_terms=true](https://afdc.energy.gov/stations/#/analyze?region=US-SC&country=US&access=public&access=private&fuel=ELEC&ipg_secondary=true&hy_nonretail=true&ev_levels=all&show_ev_terms=true))

## Resources by Topic Area

During the EV Stakeholder Initiative process many resources related to electric vehicles were discovered, explored, and occasionally referenced in the Report. This Appendix D (while not exhaustive) captures many of the links to those resources. Please note that with the dynamic nature of the subject, not all available resources are listed. The following links to more information and tools are loosely organized by topic area.

### • Maps for finding Charging Locations

- PlugShare – EV trip planning tool.
- <https://chargehub.com/en/charging-stations-map.html>
- A Better Routeplanner

### • Planning tools

- <https://www.cooperative.com/remagazine/articles/Pages/Tech-Insights-EV-Forecasting-Tool.aspx>
- Electrification Coalition - EV Tools and Calculators Clearinghouse

#### A few examples:

- Dashboard for Rapid Vehicle Electrification: DRVE Tool
- Total Cost of Ownership Calculator
- Energy Policy Solutions – Policy Simulator
- Total Cost of Ownership Estimator

NC's model: <https://www.newsobserver.com/news/local/article262796578.html>

- ORNL – [Regional Electric Vehicle Infrastructure Strategic Evolution \(REVISE\) Model](#) – Planning tool for inter-city corridor public charging infrastructure
- PNNL – [GridLAB-D](#) – Smart grid design
- INL – [Caldera](#) – EV charging structure simulation platform
- NREL – [EVI-X Modeling Suite](#) – For large-scale electric vehicle charging infrastructure – regional, state, national
- ANL – [JOBS Models](#) – Estimate the economic impact of deploying alternative fuel equipment and infrastructure.
- Sandia – Distributed Energy Feeder Capacity Analysis & Mapping (DEFCAM) – EV hosting capacity analysis on distribution feeders exported in GIS files for mapping. No online information
- ANL – [Energy Zones Mapping Tool](#) –

Mapping tool to identify potential energy resource areas and energy corridors.

### • Education and Outreach

- [US Department of Energy - Electric Vehicles Have Lower Scheduled Maintenance Costs than Other Light-Duty Vehicles](#)
- [Used Electric Vehicle Buyers' Guide](#)
- [California Example Resource - Plug 'N Drive](#)
- [EV Trip Planner](#)
- [Innova EV Car Share](#)

### • Equity

- [Greenlining Institute - MOBILITY EQUITY FRAMEWORK: HOW TO MAKE TRANSPORTATION WORK FOR PEOPLE](#)
- [Electric Car Equity Communication Toolkit](#)
- [Advancing Transportation Electrification In Diverse Communities: A Public Policy Toolkit for Policymakers](#)
- [Greenlining Institute - Electric Carsharing in Underserved Communities: Considerations for Program Success](#)
- [RMI Study – EV Charging for All](#)
- [Greenlining Institute - Making Equity Real in Mobility Pilots Toolkit](#)

- [The American Council for an Energy-Efficient Economy \(ACEEE\) - Siting Electric Vehicle Supply Equipment \(EVSE\) With Equity in Mind](#)
- [The Regulatory Assistance Project - How Electrifying Trucks Can Help Roadside Neighborhoods Breathe Easier](#)
- [The American Lung Association - The Road to Clean Air Benefits of a Nationwide Transition to Electric Vehicles](#)
- [Greenlining Institute - Low- and Zero-Emissions Zones: Opportunities and Challenges in Designing Equitable Transportation Policies](#)
- [Medical News Today - Dementia: Traffic noise may raise risk](#)
- [The Parking Professional: Accessibility and EV Charging Stations](#)
- [Minnesota EV Charging ADA Requirements](#)
- [PUGET SOUND CLEAN AIR AGENCY - FACILITATING LOW INCOME UTILIZATION OR ELECTRIC VEHICLES: A FEASIBILITY STUDY](#)
- [NREL - Energy Justice: Key Concepts and Metrics Relevant to EERE Transportation Projects](#)

- **Incentives and Financing**

- [The Regulatory Assistance Project - Revisiting the Gas Tax](#)
- [The Regulatory Assistance Project Webinar - Funding Transportation in an Electrified World](#)
- [New Jersey's Electric Vehicle Incentive Programs](#)
- [Argonne National Lab - Affordability of Household Transportation Fuel Costs by Region and Socioeconomic Factors](#)
- [Northeast States for Coordinated Air Use Management \(NESCAUM\) - Building Reliable EV Charging Networks: Model State Grant and Procurement Contract Provisions for Public EV Charging](#)
- [Colorado Used EV Incentive](#)



## • Infrastructure

- [National Association of State Energy Officials - Electric Vehicle Charging Needs Assessment - West Rural and Underserved](#)
- [Tennessee Tech - DEVELOPING AN EV DEMONSTRATION TESTBED IN THE UPPER CUMBERLAND REGION OF TN](#)
- [Transform CA - Community Transportation Needs Assessment: Process, Results, and Lessons Learned](#)
- [City of Atlanta EV Readiness Workbook](#)
- [US Environmental Protection Agency - An Introduction to Electric Vehicle-Ready Buildings](#)
- [Hilton Head Zoning: 16-5-107.D.10. Use of Parking Spaces as Electric Vehicle \(EV\) Charging Station](#)
- San Diego Gas & Electric Co.'s (SDG&E) "[Power Your Drive](#)" program designed to develop charging infrastructure at MUDs and workplaces.
- Settlement in Xcel CO Transportation Electrification Plan case ([Eligibility for Equity-Focused Programs](#)) 22. [Eligibility for \*\*Multifamily Housing\*\* \(MFH\) Income-Qualified Programs](#)
- [Southwest Energy Efficiency Project - Cracking the Code on EV-Ready Building Codes](#)
- [Charging Forward: A Toolkit for Planning and Funding Rural Electric Mobility Infrastructure](#)





[energy.sc.gov](http://energy.sc.gov)