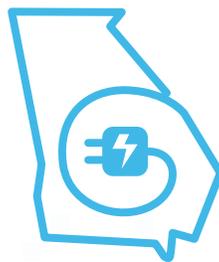




# ELECTRIC MOBILITY AND INNOVATION ALLIANCE



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2021-2022 ALLIANCE REPORT

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January 2023

Office of Governor Brian P. Kemp

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Members of the Georgia General Assembly:

Since my first day in office, bringing jobs and opportunity to our state for hardworking Georgians has been and remains my administration's top priority. Planning for a future of continued success in this area requires early recognition of shifting economic and industry trends to keep Georgia the No. 1 state for business.

The automotive industry will see more change in this decade than it has in the past century. According to the Alliance for Automotive Innovation, automakers are planning to invest \$250 billion in electrification by this next year alone, and IHS Markit predicted a rapid increase in the number of EV models available to consumers in the U.S. by 2026.

But the future of transportation and mobility is not just automotive. Electric mobility encompasses everything involved in transporting people and products both by ground and by air, using different modes of travel including mass transit and e-bicycles, as well as innovative ideas that have not even been conceived yet. In July 2021, I announced the formation of the Electric Mobility and Innovation Alliance (EMIA) with the purpose of bringing together industry leaders, subject matter experts, and elected officials to develop a roadmap that will keep Georgia at the forefront of the e-mobility and innovation revolution. Enclosed herein is the first EMIA report, complete with recommendations for how we can secure the Peach State's reputation as the national leader in this emerging industry.

I would like to thank all the participants of the Alliance for their dedication and efforts. The following report summarizes opportunities available to attract new manufacturers and suppliers while supporting existing businesses, outlines workforce training needs, recommends continued expansion of infrastructure to support e-mobility, and includes proposed policies and initiatives designed to facilitate adoption and industry innovation.

I'm happy to report that since 2018, we have announced more than 35 electric-mobility related projects that will bring nearly \$23 billion in investment and create approximately 28,000 jobs for Georgians. This includes automotive original equipment manufacturers Hyundai Motor Group (HMG) and Rivian, which are both building major electric vehicle manufacturing facilities in the state. These companies cited our robust infrastructure, renewable energy production, and the availability and quality of talent as key reasons for locating in Georgia.

As these new markets continue to grow, with your help and leadership, we will work to further our position as a national leader in the e-mobility sector. I appreciate your consideration of the recommendations offered by the Alliance in this report and look forward to working with you as we take new steps that will bring even more jobs and opportunity to our communities, keeping Georgia the best place to live, work, and raise our families.

Sincerely,

Brian P. Kemp



## Committee Chairs



**Stuart Countess**

President and CEO of Kia Georgia,  
Supply Chain Committee



**Cynthia Curry**

Senior Director, Smart Cities and CleanTech Ecosystems  
at the Metro Atlanta Chamber,  
Innovation Committee



**Randall "Randy" Hatcher**

President of MAU Workforce Solutions,  
Workforce Committee



**Jannine Miller**

Director of Planning for the Georgia Department of Transportation,  
Infrastructure Committee



**State Representative Bruce Williamson**

Policy and Initiatives Committee

# Georgia’s Electric Mobility and Innovation Alliance

In July 2021, Governor Brian Kemp created the Georgia Electric Mobility and Innovation Alliance (EMIA, also referred to as “the Alliance”). The project, led by the Georgia Department of Economic Development, is a statewide initiative that brings together representatives from government, industry, electric utilities, education, nonprofits, and other relevant stakeholders. The purpose of the Alliance is to identify ways to support the growth of the entire electric mobility sector and foster innovation in the State of Georgia by creating a business-friendly environment for the industry and promoting favorable public policy. While the Alliance has the long-term goal to bring new investments to Georgia, it also seeks to support the state’s existing industry. The Alliance is organized into five working committees based on five focus areas, as shown below.

## Alliance Committees

The Alliance is focused on growing the electric mobility ecosystem in the state and strengthening Georgia’s position in electrification-related manufacturing and innovation.

 <p><b>Infrastructure Committee</b></p> <p><b>Chair</b> Jannine Miller, Georgia Department of Transportation</p> <p><b>Purpose</b> Identify opportunities to expand the state of the EV charging infrastructure in Georgia, including a consideration of public and private initiatives.</p>	 <p><b>Supply Chain Committee</b></p> <p><b>Chair</b> Stuart Countess, Kia Georgia</p> <p><b>Purpose</b> Identify opportunities to attract and grow the electric mobility supply chain (EV and other applications).</p>	 <p><b>Workforce Committee</b></p> <p><b>Chair</b> Randall Hatcher, MAU Workforce Solutions</p> <p><b>Purpose</b> Identify opportunities to build out resources to expand the talent pipeline for industry growth in Georgia.</p>	 <p><b>Innovation Committee</b></p> <p><b>Chair</b> Cynthia Curry, Metro Atlanta Chamber</p> <p><b>Purpose</b> Identify opportunities to promote technical innovations related to powering vehicles and innovations in mobility.</p>	 <p><b>Policy &amp; Initiatives Committee</b></p> <p><b>Chair</b> Bruce Williamson, Georgia State Representative</p> <p><b>Purpose</b> Identify policy strategies that will help state government support and grow Georgia’s electric mobility and innovation industries in economical and sustainable ways.</p>
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Each committee met three times. Committee members provided input through presentations, commentary, small group discussion, and individual interviews. Facilitation and research support were provided by the University of Georgia’s Carl Vinson Institute of Government. This report summarizes broad themes related to e-mobility opportunities available to Georgia. This document does not represent an endorsement by or of any policy, group, or individual. In the Alliance’s view, this report is the foundation of a wider and ongoing effort by the state to support and grow the e-mobility sector.

## Alliance Membership and Acknowledgements

The Georgia Department of Economic Development would like to express its appreciation to the Alliance committee members and chairs from the following organizations who gave their time and expertise.

- ALBAform
- Amazon
- Bellamy Strickland Chevrolet Buick GMC
- Blue Bird Corporation
- Butler Automotive Group
- Capital City Electrical Services
- ChargePoint
- Chemours
- Cimbar Performance Minerals
- Clean Cities Georgia
- Cox Automotive Inc.
- Curiosity Lab at Peachtree Corners
- DEUTZ Corporation
- Electric Cities of Georgia
- Energy Assurance
- Freeing Energy Project/Solar Inventions
- GEDIA Automotive Group
- Georgia Automobile Dealers Association
- Georgia Chamber of Commerce
- Georgia Department of Economic Development
- Georgia Department of Transportation
- Georgia Electric Membership Corporation (EMC)
- Georgia General Assembly
- Georgia Institute of Technology
- Georgia Ports Authority
- Georgia Power
- Georgia System Operations Corporation
- Georgia Transmission Corporation
- Green Power EMC
- Greenlots
- Heliox
- Kia Georgia
- MAU Workforce Solutions
- Mercedes-Benz USA
- Metro Atlanta Chamber of Commerce
- Nuro
- Oglethorpe Power Corporation
- ParkENT Cycles
- Partnership for Inclusive Innovation
- Porsche Cars North America, Inc.
- RaceTrac
- RavenVolt, Inc.
- Rivian
- SK Innovation
- Smith Electric Vehicles
- Southern Alliance for Clean Energy
- Southern Company
- Technical College System of Georgia
- Tesla
- The Ray
- University of Georgia
- University System of Georgia
- Volkswagen

The Georgia Department of Economic Development would also like to thank the University of Georgia's Carl Vinson Institute of Government for research and facilitation support. Additional thanks to the following organizations outside of the Alliance that presented at committee meetings and provided additional information.

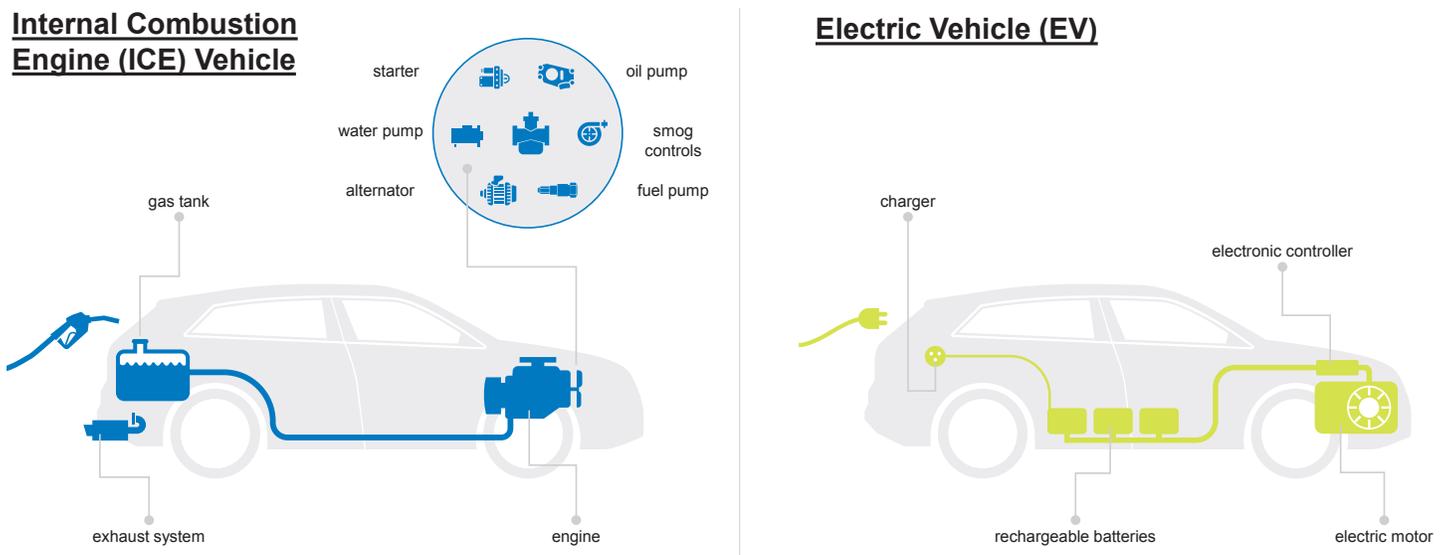
- Advanced Technology Development Center (ATDC)
- Avertium
- Center for Urban and Regional Air Mobility at Georgia Tech
- Construction Education Foundation of Georgia
- Georgia Research Alliance (GRA)
- JTEC Energy
- MP Materials
- Novelis
- Plug Power
- Li-Cycle
- Textron Inc.
- UPS

# What Is E-Mobility?

Electric mobility, or e-mobility, goes beyond electric passenger vehicles to encompass a variety of vehicles from personal-use vehicles, such as scooters, bicycles, and golf carts, to industrial-use vehicles, such as forklifts, garbage trucks, and tractors. E-mobility can include mass transit vehicles, such as school and public transit buses, passenger trains, airport shuttles, and other fleet-type vehicles used to move people, as well as aircraft, water, and off-road vehicles like electric air taxis, boats, and mechanized equipment used in construction, agriculture, railyards, airports, and ports.

Electric vehicles (EVs) differ from internal combustion engine vehicles (ICEVs) in several ways. Instead of a gasoline tank, EVs have battery packs. In general, EVs have fewer parts than ICEVs (see Figure 1). In addition, innovations in how EVs are powered and charged, how they interact with the road, and how they connect with other vehicles and infrastructure (commonly referred to as V2X, or vehicle to everything) are rapidly accelerating.

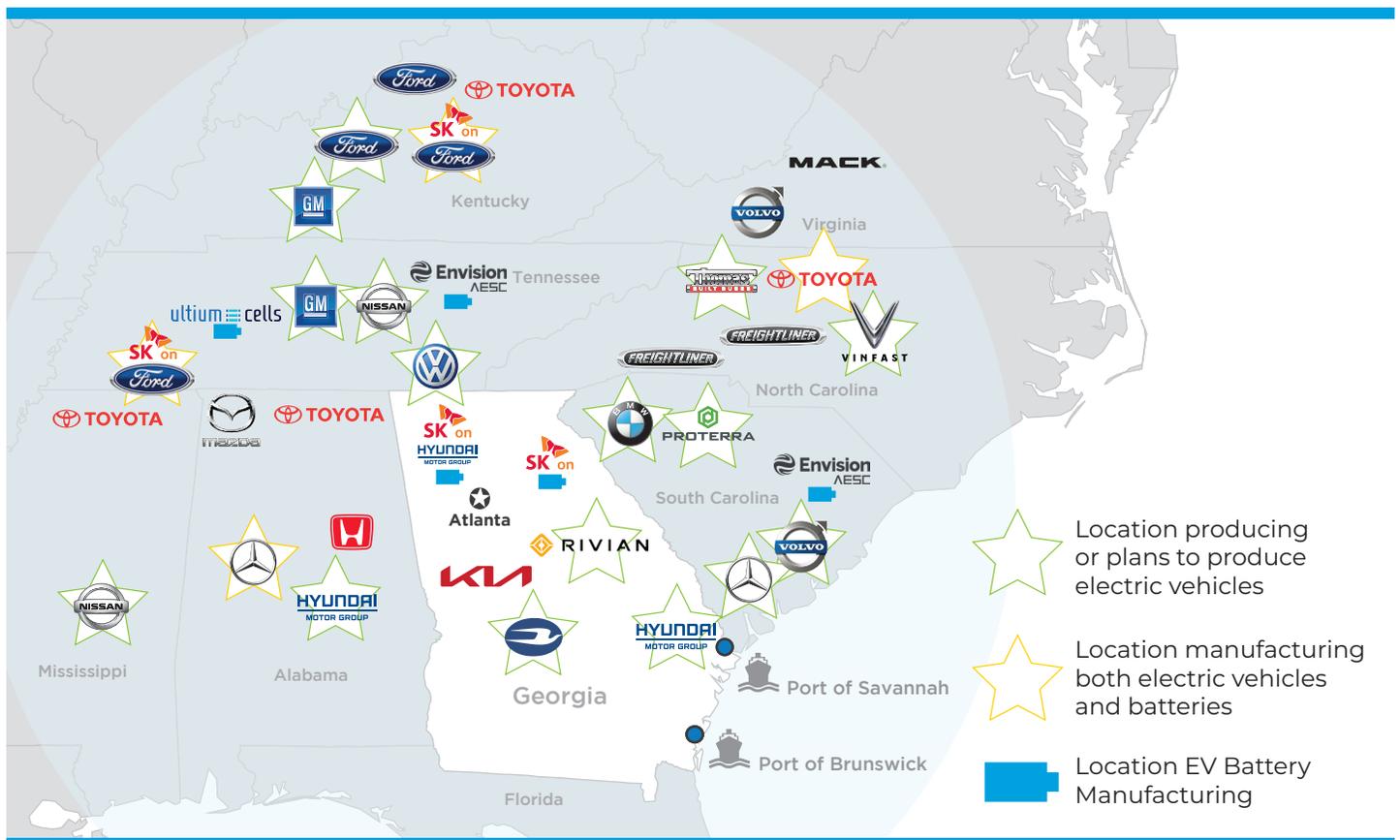
**Figure 1. Components of an ICE Vehicle Compared to an Electric Vehicle.**



# Georgia's Changing Automotive Industry

Georgia is at the center of the rapidly expanding Southeast Automotive Alley, which is home to 19 car, light-duty, and heavy-duty vehicle manufacturing facilities. An additional 13 assembly plants are located within 500 miles of the state, supported by a vast network of suppliers (see Figure 2). This automotive network generates significant employment, investment, and tax revenue in the state.<sup>1</sup> Within the last five years, 116 automotive-related companies have located or expanded operations in Georgia, creating 25,357 new jobs.<sup>2</sup> These companies benefit from the state's prime location, extensive infrastructure, skilled workforce, and business-friendly climate. For over a century, Georgia has fostered healthy industry practices, encouraged collaboration and innovation, and positioned itself as a leader in developing and harnessing emerging technologies for the evolving automotive and mobility industries.

**Figure 2. Vehicle Manufacturers Within 500 Miles of Georgia.**

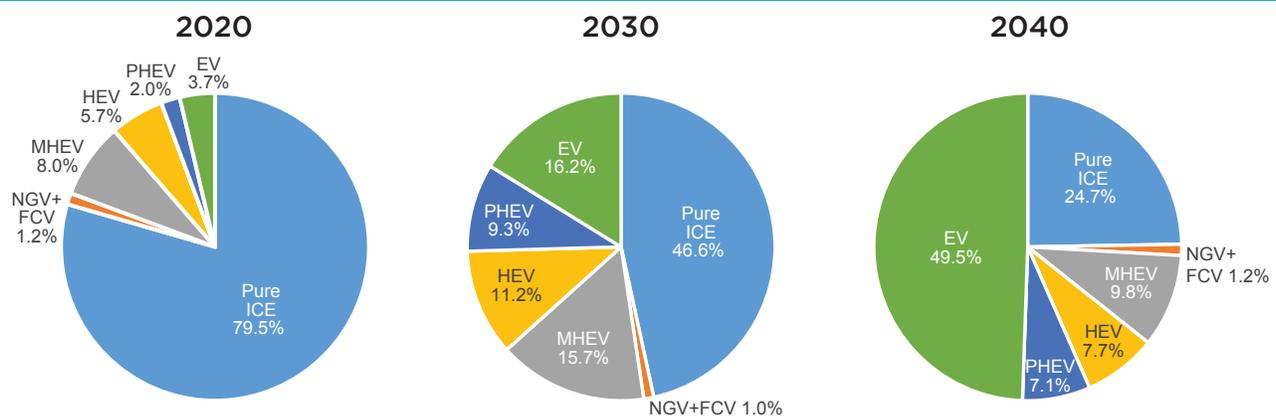


Source: Georgia Power Community and Economic Development

As the e-mobility sector continues to grow and mature, four factors are driving the pace and volume of change.

- **Technology-Driven Electrification.** Technological advancements are an important factor driving the e-mobility sector. Research and development efforts in battery technologies are improving the performance, cost, and safety of batteries, making battery-powered vehicles more competitive in the marketplace. Other technologies are opening doors to future markets for autonomous vehicles, connected vehicles, flying vehicles, agricultural applications, and software/cybersecurity advancements. Companies are considering new business models and customer segments based on the possibilities presented by these new products and applications.
- **Public and Private Decarbonization Goals.** Governments and companies around the world are working to reduce their carbon emissions by setting clear goals, including the promotion and adoption of EVs. OEMs have set targets to electrify their fleets.<sup>3</sup> Almost every automotive manufacturer has announced the release of dozens of new EV models by 2030, with some companies and governments even announcing plans to be fully electric within two decades.
- **Increasing Consumer Demand.** Research and advancing technologies have led to a significant increase in demand for EVs, which is only expected to increase in the future. In 2020, more than 300,000 EVs were sold across the US, a dramatic rise from the 17,763 EVs sold in 2011.<sup>4</sup> This increase in sales brought last year's total number of registered EVs in the US to more than 1.6 million.<sup>5</sup> Global market share of EVs is projected to grow from just 4% of the market to 16% by 2030, and 50% by 2040.<sup>6</sup> Figure 3 shows global consumer demand for vehicles by fuel type in 2020 and projected demand in 2030 and 2040.

**Figure 3. Global Consumer Demand for Electric Vehicles, 2020, 2030, and 2040**



Note: ICE = Internal combustion engine; NGV+FCV = Natural gas vehicle + fuel cell vehicle; MHEV = Mild hybrid electric vehicle; HEV = Hybrid electric vehicle; PHEV = Plug-in hybrid electric vehicle; EV = Electric vehicle (or Battery electric vehicle)

Source: Harrison, Daniel, and Christopher Ludwig. 2021, June. *Electric Vehicle Battery Supply Chain Analysis: How Battery Demand and Production are Reshaping the Automotive Industry*. Automotive from Ultima Media.

Consumer demand in Georgia is strong and continues to grow. Georgia is 10<sup>th</sup> highest in the nation for the number of EVs registered, and 16<sup>th</sup> in the number of registrations per 100,000 population aged 18 and over.<sup>7</sup> As of September 2022, there were 42,659 registered electric vehicles in Georgia, a 174% increase from the 15,551 registered in 2014.<sup>8</sup> More than 4,000 EVs were sold in Georgia in 2021 alone, representing a total annual growth of 29%.<sup>9</sup> In 2021, there were 58 EV models available for sale in the state, well above the national average of 49.<sup>10</sup>

- **Economic Competition.** The e-mobility sector, currently largely located in Asia, is now moving to Europe and the US to ensure production output can meet growing demand. An “arms race” has emerged to secure jobs, investments, and tax revenues. National actions have included “buy local” regulations, such as the US-Mexico-Canada trade agreement, development of the *National Blueprint for Lithium Batteries*, and e-mobility investments in the 2021 Infrastructure Investment and Jobs Act. State actions have involved competing for corporate relocations, particularly as auto and battery manufacturers create partnerships for production facilities.

## E-Mobility Opportunities for Georgia

As these new markets emerge, Georgia is set to be a national leader in the e-mobility sector. Opportunities exist to develop a strong e-mobility sector, which includes attracting new manufacturers and suppliers to the state while supporting existing businesses as they successfully navigate this transition to electrification.

The Alliance identified 10 opportunities to help Georgia become a national leader in e-mobility, presented below in no particular order.

- E-mobility leadership and governance in Georgia.
- E-mobility technology through Research and Development and commercialization.
- E-mobility manufacturers and suppliers.
- E-mobility workforce.
- Expansion of charging infrastructure.
- Electrification of fleets.
- Battery recycling/reuse ecosystem.
- Georgia's logistics infrastructure.
- Consumer demand for and awareness of EV technologies.
- Policy framework for e-mobility growth.

## E-Mobility Leadership and Governance in Georgia

Georgia is well-positioned to take a leading role in the e-mobility sector. Strong, effective leadership can help make the most of this historic opportunity and demonstrate that e-mobility is a priority for the state. Leadership can coordinate planning efforts, work with the business community, and implement investments and improvements in support of the e-mobility sector.

### Assets to build upon

- The Governor's Office, legislative leaders, local leadership, and key agencies actively support e-mobility.
- Alliance members—representatives from business, academia, nonprofits, and others—are eager to support and contribute to the state's work in the e-mobility sector. A vision for e-mobility sector growth is starting to take shape and movement has begun.
- The state has experience and success in building industry sectors, such as the film, cybersecurity, logistics, and advanced manufacturing industries.
- Georgia's pro-business climate and robust workforce assets continue to attract record-breaking jobs and investment to the state.

### Actions to consider

- Establish e-mobility leadership at the state level to implement priorities, coordinate efforts across state agencies, work with the business community, and provide a venue for ongoing conversations and planning.
- Designate state agency contacts to solicit input on priorities and to implement specific actions.

- Continue engaging representatives from business, nonprofit, academic, and other sectors through the work of the Electric Mobility and Innovation Alliance.
- Work with the business community to establish an e-mobility business association to support growth in the sector, similar to efforts in the financial technology and carpet industries.
- Develop regional partnerships with chambers of commerce, Georgia Municipal Association, Association of County Commissioners of Georgia, and regional commissions to build support and help coordinate efforts.
- Engage the Georgia Department of Education and other education stakeholders on e-mobility efforts throughout the statewide education system.

### Potential areas of focus

- “One-stop-shop” for businesses, investors, and others seeking e-mobility opportunities in the state
- Venues for thought leadership and communication regarding e-mobility workforce, research and development, supply chain, commercialization, investments, infrastructure, and other areas
- Relationships with automotive manufacturers and major suppliers to identify specific needs and opportunities as they arise
- Regional partnerships with other states, like the Southeast E-Mobility Coalition, and the public-private partnership “Drive Change. Drive Electric.”
- Data collection and analysis for developing recruiting targets, locating infrastructure, applying for grants, and other purposes
- Policy and initiative coordination with the legislature, federal partners, and other funding sources

## E-Mobility Technology Through R&D and Commercialization

Research and development (R&D) in electrification is experiencing dynamic change. Areas of strong R&D activity tend to draw investment, talent, locations of corporate headquarters, and manufacturing. Georgia has an opportunity to advance e-mobility technology through R&D and commercialization to help drive growth in the e-mobility sector in the state.

### Assets to build upon

- Georgia is home to several top research institutions with innovation and business centers that provide significant R&D and commercialization support to startups and mature businesses in the state. The Georgia Research Alliance works with all major research universities in the state to recruit talent, attract grant funding, and help foster new scientific discoveries. See Figure 4 for examples of university-based R&D centers and institutes in Georgia.
- The Center of Innovation, a strategic arm of the Georgia Department of Economic Development, provides expert staff members, external partners, and independent mentors to businesses of all sizes that are trying to commercialize innovative products and services.
- Georgia hosts unique innovation labs supporting e-mobility, such as The Ray and Curiosity Lab at Peachtree Corners.

- Autonomous vehicle research is taking place in many parts of the state, including in the cities of Chamblee, Woodstock, and Peachtree Corners as well as in Gwinnett County.
- The Georgia Cyber Center—a collaboration of academia, government, military, and industry—is training the next generation of cybersecurity talent.
- Georgia already has existing tax incentives that attract jobs, reduce the cost of doing business, and incentivize activities like R&D.

### Actions to consider

- Encourage more R&D at Georgia’s research universities, especially in e-mobility cybersecurity, battery storage and charging speed, new materials (e.g., graphene), alternative charging (e.g., wireless charging, catenary charging, swappable batteries), and alternative power technologies (e.g., hydrogen fuel cell batteries, solid state batteries, sodium/beryllium-ion batteries, piezoelectric [compression] technologies).
- Create a role within the Center of Innovation devoted to helping start-up companies commercialize e-mobility products and services.
- Promote the establishment of innovation labs for off-road applications (agriculture, airports, railways, construction, etc.).
- Increase recruitment of R&D professionals in the fields of e-mobility and cybersecurity for public universities and corporations.

### Potential areas of focus

- Integration of cybersecurity into all aspects of e-mobility
- Lithium-ion batteries and alternative fuels, including new designs that support recycling
- Autonomous and connected vehicles, including “first-mile/last-mile” applications
- Electric aircraft R&D
- Agricultural and other off-road applications (i.e., airports, railways, construction, film sets, schools, warehousing, ports, etc.)
- Disaster relief applications (e.g., the use of electric school buses as backup generators)

**Figure 4. Examples of Postsecondary Research and Development Centers and Institutes in Georgia**

<b>Georgia Institute of Technology</b>	Georgia Tech Research Institute (GTRI) Advanced Technology Development Center (ATDC) Center for Innovative Fuel Cell and Battery Technologies Strategic Energy Institute Manufacturing Institute 3D Systems Packaging Research Center
<b>University of Georgia</b>	Innovation District Innovation Gateway Intelligent Power Electronics and Electric Machine Laboratory College of Engineering battery engineering-related research Institute for Cybersecurity and Privacy (ICSP)
<b>Georgia State University</b>	ENgaging Educators in Renewable Energy (ENERGY)

## E-Mobility Manufacturers and Suppliers

As automotive manufacturers are restructuring, integrating, and relocating their supply chains, Georgia has opportunities to attract new vehicle manufacturers and suppliers, while supporting existing companies.

### Assets to build upon

- Georgia is at the center of the rapidly expanding Southeast Automotive Alley, which is home to 30 assembly plants located within 500 miles. Georgia also has an expansive network of automotive suppliers that supports these plants. See Figure 5 for a list of companies in Georgia that are part of the EV supply chain.
- Georgia has become the preferred location for firms in the emerging lithium-ion battery supply chain, including mining, materials processing, and manufacturing of battery cell components, modules, and packs.
- The state offers many tax incentives and other benefits for manufacturing companies.

### Actions to consider

- Create a recruitment plan to help maximize opportunities to recruit new companies and promote the growth of existing companies in the EV supply chain.
- Expand geological research to help materials-processing companies identify and map minerals critical to the e-mobility supply chain.
- Create expedited and improved permitting processes to support supply chain recruitment efforts while maintaining existing environmental and health standards.

### Potential areas of focus

- Battery component manufacturers, battery cell manufacturers, and e-mobility manufacturers
- Foreign-based companies, small businesses, and startups
- Assistance for traditional ICEV suppliers and their employees in the transition to electrification
- Growth of automotive-related supply chain manufacturing opportunities in rural communities

**Figure 5. EV Supply Chain Companies in Georgia**

### Automotive Manufacturers and Suppliers in Georgia

- Kia Georgia — Manufactures the Telluride CUV, Sorento CUV, and K5 midsize sedan. Its parent company has announced plans to offer 11 EVs by 2025.<sup>11</sup>
- Rivian — Will manufacture electric vehicles at its carbon-conscious campus. Once operations are fully ramped up, the facility will be capable of producing up to 400,000 EVs per year.
- Blue Bird Corporation — Manufactures ICE and electric buses.
- Caterpillar — Manufactures small track-type tractors and mini hydraulic excavators. Is actively developing all-electric heavy equipment, particularly for the underground mining industry, and has unveiled several pieces of machinery in the past few years.
- Textron Specialized Vehicles — Manufactures a wide variety of personal utility vehicles including golf cars, snowmobiles, all-terrain vehicles (ATVs), and neighborhood electric vehicles.
- Club Car — Manufactures both gasoline-powered and all-electric golf cars and other personal utility vehicles.
- JCB — Manufactures over 300 types of construction equipment and produces an all-electric mini excavator. Recently announced plans for additional pieces of electric construction equipment.
- Kubota — Manufactures tractors, mowers, construction equipment, hay/farm implements, and utility vehicles. Recently unveiled prototypes of a battery-powered compact tractor and battery-powered mini excavator.
- Yamaha Motor Manufacturing Corporation — Designs and manufactures golf cars, ATVs, personal watercraft, and recreational off-road vehicles.
- Suzuki Manufacturing of America Corporation — Manufactures the KingQuad ATV.
- GEDIA Automotive Group — Specialist manufacturer of lightweight vehicle body engineering and chassis components.
- ALBAform — Designs, develops, and manufactures precision metal components, frames, and weldments for the automotive, agricultural, and aerospace industries.
- Hyundai — Will manufacture batteries to be used in electric vehicles as well as several EV models like the Hyundai Ioniq 7 and Kia EV9. Once operations are fully ramped up, the facility is expected to be capable of producing 300,000 electric vehicles per year.
- Heliox — Designs, develops, and manufactures fast-charging systems for private and public transport electric vehicles. Has installed more than 1,600 high-powered fast-charging points worldwide and has implemented one of the world's largest e-bus projects.
- TEKLAS — Designs, develops, and manufactures fluid circulation systems for cooling and heating applications, which includes hoses and pipes from rubber, plastic, and metal for the global automotive industry.
- Doosan Industrial Vehicle America — Manufactures high weight capacity electric warehouse vehicles including forklifts, reach trucks, and pallet trucks.
- Hyundai TRANSYS — Manufactures ultra-lightweight seats designed for use in electric vehicles.
- Kirchoff Automotive — Manufactures lightweight body components used in electric vehicles.
- Hyundai MOBIS - will manufacture EV Power Electric Systems and Integrated Charging Control Units.
- Joon Georgia - a part of AJIN USA, will produce a variety of automotive parts for use in electric vehicles.

### Battery Supply Chain Companies in Georgia

- Aurubis — Will open a facility for multi-metal recycling. Circuit boards, copper cable, and other materials containing metals will be processed into 35,000 tons of blister copper annually. These metals are crucial for digitalization, renewable energies, and electric vehicles.
- Ascend Elements (former Battery Resourcers) — Will open a lithium-ion battery recycling plant with the capacity to process 30,000 metric tons of discarded batteries and scrap annually, the equivalent of 70,000 vehicle batteries per year.

## Battery Supply Chain Companies in Georgia

- CIMBAR Performance Minerals — Operates 16 mining and processing sites in the US, China, Mexico, and Pakistan.
- Dongwon Tech Corporation — Produces rectangular air ducts for SK Battery America and another local heating, ventilation, and air conditioning (HVAC) company.
- Duckyang — Manufactures automotive battery modules and energy storage systems.
- EcoPro BM America Inc. — Develops and produces high-nickel cathode materials.
- Enchem — Specializes in the development and manufacturing of electrolytes for rechargeable batteries and electrostatic double-layer capacitors.
- Energy Assurance — Operates an accredited cell and battery testing facility for battery manufacturers and distributors.
- Halocarbon — Partners with leading lithium-ion battery companies to develop unique fluorochemical solutions that enhance the safety and performance of high-voltage lithium-ion batteries.
- Sila Nanotechnologies — Supplies battery materials high capacity anodes for electric vehicle batteries.
- SK Battery America, Inc. — Manufactures lithium-ion batteries for electric vehicles made by Volkswagen and Ford in neighboring states.
- Wonbang Tech — Builds clean rooms for battery manufacturers.
- Aspen Aerogels — Manufactures a thin, lightweight, high-temperature thermal insulation and fire barrier used to mitigate thermal runaway propagation in EV batteries used by GM, BYD, and Toyota.
- Plug Power — Produces hydrogen power as a source of green and zero-emission fuel production for use in electric vehicle batteries.
- ElringKlinger — Manufactures electric vehicle battery components, modules, and complete battery systems. Supplies specialty gaskets, housing modules, shielding components, and exhaust gas purification technology to the automotive sector.
- GS Yuasa Energy Solutions — Manufactures lithium power modules for use in electric vehicle batteries. Home to the first commercial solar array with storage, providing emission-free production.
- Liochem — Manufactures conductive additives for lithium-ion cathodes.
- Sung-II Hitech — Will open a lithium-ion battery recycling facility with the capacity to recycle 10,000 metric tons of discarded battery material annually, the equivalent of 23,000 vehicle batteries each year.
- Trojan Battery — Manufactures lithium-ion batteries for all-electric golf cars, utility vehicles, and neighborhood electric vehicles with capacities up to 48 volts.
- Denka America — Will manufacture electrodeposited copper coils for lithium-ion batteries.
- Cimbar Performance Materials — Operates 16 mining and processing sites in the US, China, Mexico, and Pakistan, supplying mineral based additives for the production of electric vehicle batteries.
- GS Yuasa Energy Solutions — Manufactures lithium power modules lithium-ion batteries and battery components for use in electric vehicles. Home to the first commercial solar array with storage, providing emission-free production.
- Solvay - Will expand their facility to produce polyvinylidene fluoride for use in electric vehicle batteries. This chemical increases the mileage capacity and long-term durability of an EV battery. Once at full capacity, the plant will supply enough of the chemical to be used in over 5 million EV batteries per year.
- FREYR - a developer of clean, next-generation battery cell production capacity will have a planned first phase production of approximately 34 gigawatt hours.
- Hyundai Motor Group/ SK On - will manufacture batteries for electric vehicles, details of the partnership are still in development.

## E-Mobility Workforce

The availability of talent is a key consideration as e-mobility companies move to Georgia. Therefore, efforts to develop and recruit talent are critical opportunities for Georgia. Areas with existing and emerging workforce needs include battery manufacturing, general automotive manufacturing and maintenance, cybersecurity, and data analytics. The automotive industry's shift to e-mobility will impact existing automotive suppliers by enabling them to change their product offerings and reskill their workforce. Figure 6 shows projections for e-mobility related occupations in Georgia for 2021–2026.

**Figure 6. Projections for EV-Related Occupations in Georgia**

Occupation	2021 Jobs	2026 Jobs	2021–2026 % Change
Chemical engineers	574	640	11%
Chemists	1,619	1,784	10%
Commercial and industrial designers	1,026	1,096	7%
Computer numerically controlled tool operators	1,879	2,050	9%
Electrical engineers	4,608	4,912	7%
Electrical power-line installers and repairers	4,440	4,648	5%
Electrical, electronic, and electromechanical assemblers, except coil winders, tapers, and finishers	4,465	5,013	12%
Electricians	18,035	19,381	7%
Electronics engineers, except computer	4,576	4,654	2%
Engine and other machine assemblers	966	1,029	7%
Industrial engineers	7,854	8,655	10%
Industrial production managers	4,415	4,794	9%
Machinists	8,176	8,971	10%
Materials engineers	360	392	9%
Materials scientist	111	126	14%
Mechanical drafters	1,125	1,149	2%
Mechanical engineering technologists and technicians	538	613	14%
Mechanical engineers	5,502	6,080	11%
Miscellaneous assemblers and fabricators	55,026	55,110	0%
Software developers and software quality assurance analysts and testers	50,742	57,331	13%
Urban and regional planners	957	1,020	7%
<b>TOTAL</b>	<b>176,992</b>	<b>189,450</b>	<b>7%</b>

Source: EMSI, 2021,3Q; Georgia Power Community and Economic Development, 2021

### Assets to build upon

- Continue working with the Georgia Department of Education on its K-12 workforce initiatives, especially Career, Technical, and Agricultural Education programs.
- Continue promoting the University System of Georgia.
- Continue promoting the Technical College System of Georgia, Georgia Quick Start, the HOPE Career Grant, and the High Demand Career Initiative.

### Actions to consider

- Develop an E-mobility Workforce Plan that identifies strategies to address training and education gaps and is based on occupational projections, growth drivers, and stakeholder input.
- Create an E-mobility Manufacturing Careers Promotional Campaign to promote and educate citizens on opportunities in manufacturing, utilities, and the automotive industry.
- Tell Georgia's e-mobility workforce story to reinforce other marketing and promotional efforts.

### Potential areas of focus

- All skill levels (high-end, skilled, assembly, hourly, etc.) supporting each portion of the e-mobility ecosystem
- Development of an e-mobility workforce in rural Georgia that can support both manufacturing and maintenance needs

## Expansion of Charging Infrastructure

A robust charging infrastructure is critical to support the growing demand for EVs. To move to widespread adoption, current and future EV owners will require reliable, convenient, and efficient charging opportunities between their destinations, like the convenience of fueling gas-powered vehicles today. Georgia has an opportunity to leverage its leadership position in charging infrastructure to meet growing demand and demonstrate its commitment to the e-mobility sector.

### Assets to build upon

- Georgia has 1,553 publicly accessible charging stations, which provide 3,976 charging ports (see Figures 7 and 8).<sup>12</sup>
- The state offers an income tax credit of up to \$2,500 to eligible businesses for the purchase and installation of EV chargers.
- Leveraging existing and future residential and commercial rebate programs offered by electricity providers.
- Georgia has more than 1,000 miles of federally designated, EV-ready<sup>13</sup> Alternative Fuel Corridors<sup>a</sup> along its interstates and highways.
- Georgia has a highly integrated transmission system that provides reliable, low-cost electricity.
- Georgia has a strong network of existing and convenient fueling stations.

### Actions to consider

- In coordination with the Georgia Department of Transportation, implement the Statewide Charging Infrastructure Plan in compliance with the National Electric Vehicle Infrastructure Program. This plan anticipates increased demand on the existing charging infrastructure, identifies priorities and partnerships for locating charging equipment, leverages existing Alternative Fuel Corridors, and supports a business case for the private sector to invest in charging infrastructure at their existing locations.
- Explore public-private partnerships and other business models to encourage private-sector investment in the charging infrastructure and promote standardization.
- Support collaborative methods to address increased demand on the electric grid with the widespread deployment of EV charging, including technology options.
- Promote consistent and predictable electric charging installation permitting requirements across the state.

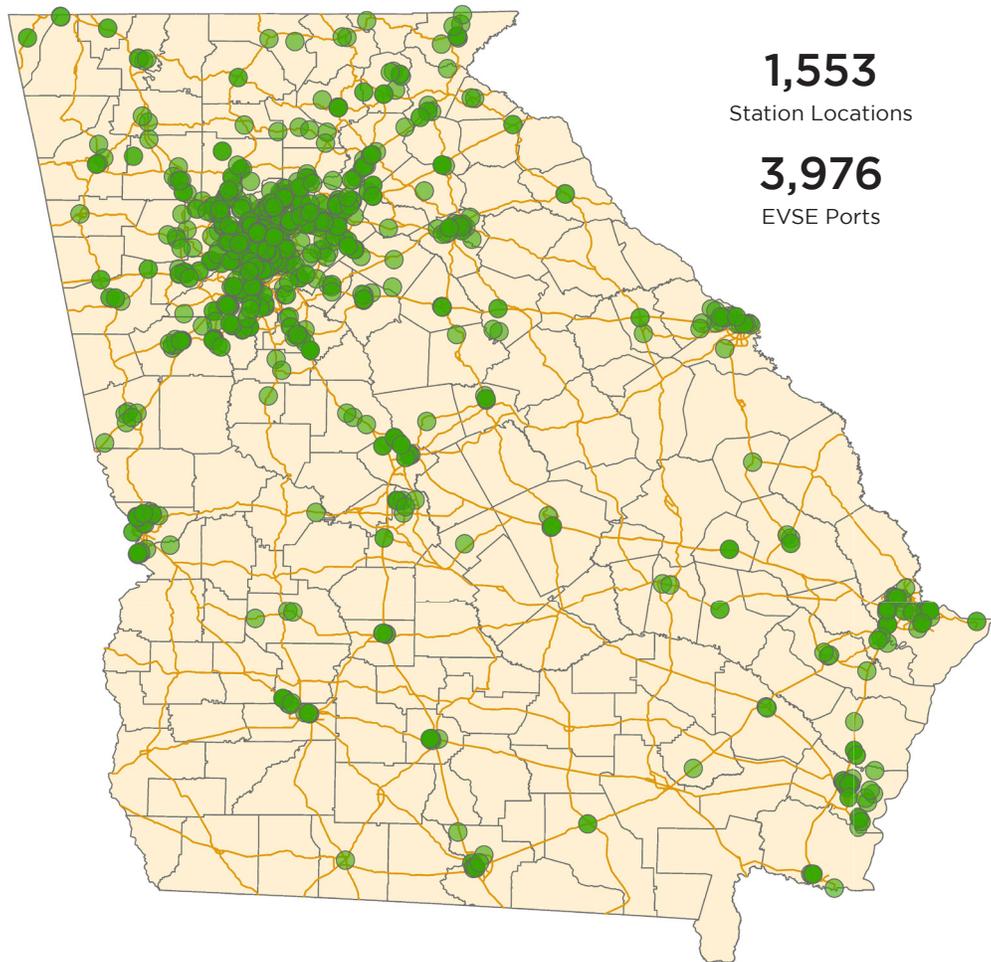
### Potential areas of focus

- Publicly accessible charging
- Workplace charging
- Multifamily home and street parking access to charging
- Fleet charging
- Charging in underserved areas
- Charging in rural areas
- Micro-mobility<sup>b</sup>

<sup>a</sup>The US Department of Transportation Federal Highway Administration (FHWA) designates Alternative Fuel Corridors, a national network of plug-in EV charging and hydrogen, propane, and natural gas fueling infrastructure along national highway system corridors. To designate the corridors, FHWA solicits nominations from state and local officials and works with other federal officials and industry stakeholders (US Department of Energy, Alternative Fuels Data Center).

<sup>b</sup>Micro-mobility refers to “electric powered modes of transport that are low-speed, small, lightweight, and typically used for short distance trips.” E-bikes and e-scooters are the most common types of micro-mobility vehicles. (Institute for Transportation and Development Policy. 2019. The electric assist: Leveraging e-bikes and e-scooters for more livable cities.)

**Figure 7. Locations of Publicly Accessible EV Charging Stations in GA, All levels**



Note: Data as of August 29, 2022.

Source: US Department of Energy, Alternative Fuels Data Center. "Electric Vehicle Charging Station Locations." Retrieved from [afdc.energy.gov/fuels/electricity\\_locations.html](https://afdc.energy.gov/fuels/electricity_locations.html)

**Figure 8. Number of Publicly Accessible EV Charging Ports in Georgia, By Level**

<b>Level 1 Chargers</b>	200
<b>Level 2 Chargers</b>	3,067
<b>Fast Chargers</b>	709

Level 1 - slow charging, 120-volt AC outlet with average 1.3-2.4 kW output, 3-5 miles of EV range per hour, full charge over 24 hours

Level 2 - faster regular charging, 208-240 volts, with average 3-19 kW output, 18-28 miles of range per hour, full charge in 8 hours or less

Direct Current Fast Chargers "Fast Chargers" - quick charging, average 50-350 kW, fill EV battery to 80% in 20-40 minutes

Note: Data as of August 30, 2022.

Source: US Department of Energy, Alternative Fuels Data Center. "Alternative Fueling Station Counts by State." Retrieved from [afdc.energy.gov/stations/states](https://afdc.energy.gov/stations/states)

## Electrification of Fleets

Public and private fleet operators are considering the use of EVs in their fleets. Georgia has an opportunity to support fleet operators as they consider EV adoption to help bolster growth of the e-mobility sector. Companies with fleet vehicles parked at a central location overnight may be early adopters of electrification because of economies of scale related to capital investment in infrastructure, vehicle maintenance, and power supply.

### Assets to build upon

- Delivery companies have large fleets that follow local, predictable routes.
- Public entities like MARTA and UGA provide transportation services that already use alternative fuel and electric buses. Many school districts also have electric school buses in their fleets.
- State and local government agencies have a variety of vehicles, some of which may be appropriate for EVs, depending on the purpose.
- Georgia's reliable electric grid and low energy rates may incentivize in-state fleet owners to consider electrification and out-of-state fleet owners to consider Georgia as a potential electric fleet location.
- Georgia-based company Blue Bird manufactures electric school buses.

### Actions to consider

- Identify strategic opportunities, such as pilot programs, for government-led fleet electrification, including public transit, school buses, first responders, waste collection, and general administration vehicles.
- Identify ways to support commercial fleet electrification, focusing on medium-duty service vehicles such as: utilities' service vehicles; appliance and home systems repair service vehicles; and logistics, warehousing, and delivery vehicles.
- Develop planning resources incorporating useful data tools, such as maps for fleet owners, to locate in areas with charging infrastructure.
- Study how electrified fleet operations could catalyze investment in underserved areas, both rural and urban.
- Explore the use of electric buses and other electric fleet vehicles as mobile power supplies in disaster recovery efforts.

### Potential areas of focus

- Charging incentives
- Analysis of use cases

## Battery Recycling/Reuse Ecosystem

One of the biggest issues facing the automotive industry is what to do with EV batteries once they are beyond their useful life in a vehicle. Georgia has the opportunity to demonstrate national leadership by creating a recycling and reuse ecosystem for batteries and other recyclable materials, which could create economic opportunity and nurture environmental stewardship.

### Assets to build upon

- Several recycling companies are located in the state, including Cox Automotive/Spiers New Technologies, Igneo Technologies, Call2Recycle, Aurubis, and Celadon.

### Actions to consider

- Develop a statewide Recycling/Reuse Ecosystem Plan in conjunction with automotive manufacturers and suppliers to establish processes, incentives, and innovations for a recycling/reuse ecosystem, as well as ways to promote the recruitment of recycling/reuse companies.
- Implement a Recycling/Reuse Awareness Campaign to make citizens aware of resources, processes, and expectations for recycling and reusing EV batteries.
- Apply a recycling/reuse strategy to all types of batteries to reclaim rare earth metals and other materials and put them back into the supply chain.

### Potential areas of focus

- Recruitment of battery recycling/reuse companies to the state
- Innovative product designs that support recycling and reuse

## Georgia's Logistics Infrastructure

The logistics infrastructure is an important part of the e-mobility supply chain: it facilitates the movement of minerals, parts, and products between suppliers, automotive manufacturers, and markets throughout the world. Technological innovations are making logistics electrified, autonomous, and connected. Georgia has an opportunity to support the e-mobility sector by expanding its logistics infrastructure and adopting new innovations.

### Assets to build upon

- Hartsfield-Jackson Atlanta International Airport is the most efficient and one of the world's most traveled passenger airports.
- Georgia has deepwater ports at Savannah and Brunswick, and inland terminals at Chatsworth and Columbus, with an additional inland port planned in Gainesville.
- Georgia has more than 3,600 miles of mainline (Class I) railroad tracks and more than 1,000 miles of shortline track. The state is also home to Norfolk Southern's corporate headquarters.
- The state is crisscrossed by more than 1,200 miles of US interstate.
- Georgia has three federally approved Foreign-Trade Zones (FTZs) located around Atlanta, Savannah, and Brunswick.

- Demonstration labs provide companies with proof-of-concept testing capabilities for vehicular and freight innovations.

#### **Actions to consider**

- Build more inland ports and related rail capacity to facilitate the flow of products through the state.
- Support the designation of more FTZs to help companies engage in international commerce.
- Support the development of demonstration labs for new electrification applications, such as railroads, airports, construction, etc.

#### **Potential areas of focus**

- Adoption of new logistics innovations to improve effectiveness and efficiency, such as solar roads, autonomous shuttles, and driver awareness connectivity
- Concentrations of manufacturing facilities with demand for imports and exports
- Rural areas of the state that offer opportunities for manufacturing sites

## **Consumer Demand for and Awareness of EV Technologies**

Building consumer awareness of the benefits of EV ownership, increasing awareness of the charging infrastructure, and demonstrating commitment to e-mobility can help Georgia become a leader in the sector and ensure a robust supply chain within the state.

#### **Assets to build upon**

- Georgia has a high rate of EV ownership compared to other states in the Southeast.
- Georgia is a national leader in charging infrastructure.
- Georgia has more than 1,000 miles of federally designated, EV-ready Alternative Fuel Corridors.

#### **Actions to consider**

- Develop state-level projections of EV demand to support state planning efforts, develop policies, and communicate opportunities in Georgia to businesses, particularly in rural Georgia.
- Consider appropriate ways to balance incentives for EVs with the need for EV drivers to fairly and sustainably do their part to ensure Georgia's world-class roadway infrastructure remains well-maintained in future decades for all vehicle types.

#### **Potential areas of focus**

- Providing information on the total cost of EV ownership
- Building familiarity with EVs and the charging infrastructure

## Policy Framework for E-Mobility Growth

State and local government regulations, incentives, and initiatives play a role in economic development. Georgia has an opportunity to put in place policies that establish a unified framework that promotes a thriving e-mobility sector.

### Assets to build upon

- Georgia provides strong tax incentives for manufacturing.
- Georgia has a demonstrated record of attracting corporate investment and job creation through tax and other incentives.
- Georgia has been recognized as the leading state in which to do business for nine years in a row.<sup>14</sup>
- Georgia actively participates in current regional efforts around e-mobility.
- All utilities in the state actively participate in current regional efforts around e-mobility.
- Significant federal funding is available to states to expand EV charging infrastructure.<sup>15</sup>
- From top-ranking colleges and universities to Georgia Quick Start — the No. 1 workforce development program in the country — Georgia offers a pipeline of talent ready for the jobs of tomorrow.

### Actions to consider

- Encourage collaborative options for electricity rates for EV charging services provided by commercial providers.
- Examine ways to relieve liability concerns for fueling stations that want to offer electricity charging and gasoline at the same location.
- Explore regulations and incentives for multifamily, workplace, and publicly available charging infrastructure.
- Collaborate with local permitting authorities to ensure there are no unintended hurdles placed that inhibit installation of electric charging infrastructure.
- Evaluate tax incentives and regulatory changes that attract new e-mobility companies and assist traditional automotive manufacturers, suppliers, and technicians as they add e-mobility to their business model.
- Study the efforts of and coordinate with other states that are deploying federal funds to leverage and expand private-sector investment.
- Utilize best practices when accessing and deploying federal funding, including maximizing private-sector investment, ensuring flexible policies, addressing barriers, and supporting innovation.

### Potential areas of focus

- Coordination with other states in the Southeast
- Coordination with utilities
- Coordination with companies that operate regionally, especially those with fleets
- Alignment with federal funding opportunities

## Conclusion

To move the state's e-mobility efforts forward, Georgia can leverage its many assets, including its world-class research and development centers, innovation labs, and entrepreneurial companies and manufacturers, including EV battery and hydrogen fuel cell producers. E-mobility in Georgia is expansive and not limited to passenger cars. It includes school buses, airport support vehicles, drones, utility carts, flying vehicles, recreation vehicles, and industrial and agricultural equipment. The state's existing tax incentives for manufacturing can be applied to e-mobility sector manufacturing. The integrated transmission system in the state provides reliable and low-cost electricity, and the state has more than 1,000 miles of federally designated Alternative Fuel Corridors that are EV-ready along its interstates and highways. These and many other assets in Georgia provide a strong foundation for e-mobility growth.

Through the work of the five committees, the Electric Mobility and Innovation Alliance identified 10 opportunities to help Georgia become a national leader in e-mobility.

- E-mobility leadership and governance in Georgia.
- E-mobility technology through R&D and commercialization.
- E-mobility manufacturers and suppliers.
- E-mobility workforce.
- Expansion of charging infrastructure.
- Electrification of fleets.
- Battery recycling/reuse ecosystem.
- Georgia's logistics infrastructure.
- Consumer demand for and awareness of EV technologies.
- Policy framework for e-mobility growth.

Within each of these opportunities, several actions are identified that will help Georgia be more strategic and able to grow and support the e-mobility sector. This report represents the beginning of a wider and ongoing effort to strategically grow e-mobility in Georgia.

<sup>1</sup>Georgia Power Community and Economic Development. 2020. “Automotive Manufacturing—Georgia: The Epicenter of Growth in the Southeastern Auto Corridor.” Retrieved from [selectgeorgia.com/documents/636/Automotive\\_Industry\\_Publication\\_2020.pdf](https://selectgeorgia.com/documents/636/Automotive_Industry_Publication_2020.pdf)

<sup>2</sup>Georgia Department of Economic Development. n.d. “Let’s talk automotive” [Brochure]. Retrieved from [79590748.flowpaper.com/autobrochure/#page=5](https://79590748.flowpaper.com/autobrochure/#page=5)

<sup>3</sup>The White House. 2021, August 5. “Fact sheet: President Biden announces steps to drive American leadership forward on clean cars and trucks” [Press release]. Retrieved from [whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/](https://whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/)

<sup>4</sup>US Department of Transportation, Bureau of Transportation Statistics. 2021, May 19. “Hybrid-electric, plug-in hybrid-electric and electric vehicle sales.” Retrieved from [bts.gov/content/gasoline-hybrid-and-electric-vehicle-sales](https://bts.gov/content/gasoline-hybrid-and-electric-vehicle-sales)

<sup>5</sup>US Department of Energy, National Renewable Energy Laboratory. 2021, June. Electric vehicle charging infrastructure trends from the alternative fueling station locator: Fourth quarter 2020. Retrieved from [afdc.energy.gov/files/u/publication/electric\\_vehicle\\_charging\\_infrastructure\\_trends\\_fourth\\_quarter\\_2020.pdf](https://afdc.energy.gov/files/u/publication/electric_vehicle_charging_infrastructure_trends_fourth_quarter_2020.pdf)

<sup>6</sup>Harrison, Daniel, and Christopher Ludwig. 2021, June. “Electric vehicle battery supply chain analysis 2021: How lithium-ion battery demand and production are reshaping the automotive industry.” *Automotive Logistics*. Retrieved from [automotivelogistics.media/electric-vehicles/electric-vehicle-battery-supply-chain-analysis-2021-how-lithium-ion-battery-demand-and-production-are-reshaping-the-automotive-industry/41924.article](https://automotivelogistics.media/electric-vehicles/electric-vehicle-battery-supply-chain-analysis-2021-how-lithium-ion-battery-demand-and-production-are-reshaping-the-automotive-industry/41924.article)

<sup>7</sup>US Department of Energy, Alternative Fuels Data Center. 2020, December 31. “Electric Vehicle Registrations by State.” Retrieved from [afdc.energy.gov/data/10962](https://afdc.energy.gov/data/10962)

<sup>8</sup>Georgia Department of Revenue, Motor Vehicle Division. 2022, August 2. “Georgia Drives e-Services Registration Statistics.” Retrieved from <https://eservices.drives.ga.gov/>

<sup>9</sup>Atlas Public Policy and the Southern Alliance for Clean Energy. 2021, August. “Transportation electrification in the Southeast: Georgia.” Retrieved from [cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia.pdf](https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia.pdf)

<sup>10</sup>Atlas Public Policy and the Southern Alliance for Clean Energy. 2021, August. “Transportation electrification in the Southeast: Georgia.” Retrieved from [cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia.pdf](https://cleanenergy.org/wp-content/uploads/Transportation-Electrification-in-the-Southeast-Georgia.pdf)

<sup>11</sup>Kia. 2020, January 14. “Kia Motors announces ‘Plan S’ strategy to spearhead transition to EV, mobility solutions by 2025” [Press release]. Retrieved from [press.kia.com/eu/en/home/media-resouces/press-releases/2020/Plan\\_S.html](https://press.kia.com/eu/en/home/media-resouces/press-releases/2020/Plan_S.html)

<sup>12</sup>US Department of Energy, Alternative Fuels Data Center. 2021, December 21. “Alternative Fueling Station Counts by State.” Retrieved from [afdc.energy.gov/stations/states](https://afdc.energy.gov/stations/states)

<sup>13</sup>Ibid.

<sup>14</sup>Arend, Mike. 2020, November 2. “Site Selection ranks Georgia and North Carolina the top state business climates for 2020” [Press release]. *Site Selection Magazine*. Retrieved from [siteselection.com/press/releases/201102.html](https://siteselection.com/press/releases/201102.html)

<sup>15</sup>IJA, Section 11401, Grants for Charging and Fueling Infrastructure.