



3 Emerging Trends in the US Electric Vehicle Workforce

October 24, 2024 By **Devashree Saha**, **Rajat Shrestha**, Evana Said, **Grace Flynn**, Jenna Schulman, **Nate Hunt** and **Sophia Chryssanthacopoulos** Cover Image by: Bob Daemrich / Alamy Stock Photo

Finding

Topic **Electric Mobility** *Region* **North America**

Across the country, workers are seeing manufacturing industries drastically transform: Where jobs are located, what employment opportunities are available, which skills are needed and how workers gain those skills are all in flux.

As this transformation takes place it is imperative to consider how these changes are impacting individual workers, families, and communities across industries and regions. Workers are finding their existing skills are not compatible with new job opportunities. Sometimes, they don't have access to training or education programs to help them develop those skills. Other times, there are opportunities to pivot and grow their skills. Stories like these are becoming more common as industries revolutionize with new technologies and adapt to cleaner energy.

These issues are especially crucial in the auto sector as it experiences a rapid transformation brought about by the adoption of electric vehicles. As auto companies, parts manufacturers and others along the auto supply chain shift to meet the new EV demands, new jobs are created and existing roles are transforming.



A worker builds an electric charging station. As EV demand grows, more jobs will be needed across the U.S. Photo by Jim West / Alamy Stock Photo.

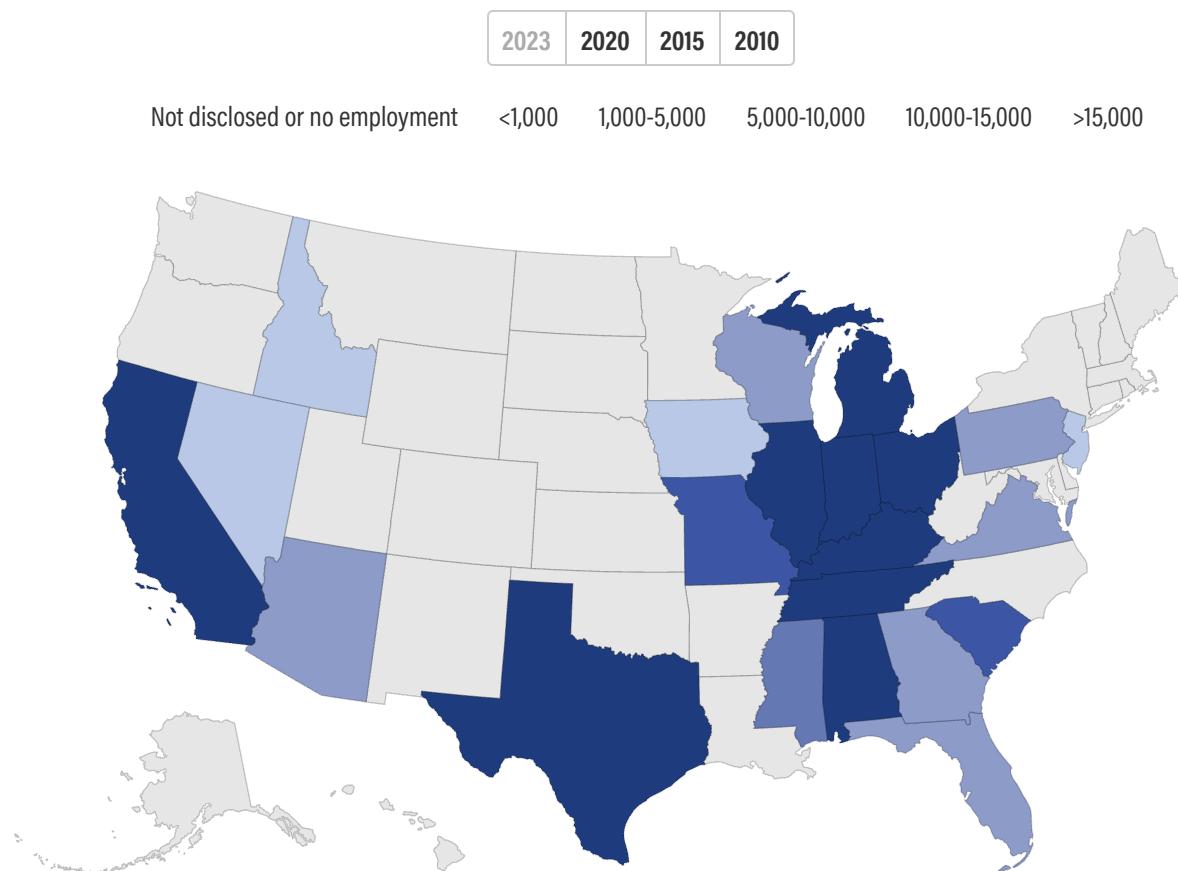
To understand how EV jobs are shifting, the kinds of jobs that will be in demand and the training and education that will be necessary so that employers have a pipeline of workers, here are three key themes coming from the current auto-industry landscape.

1) EV-Related Manufacturing Jobs are Moving Beyond Traditional Auto Manufacturing States

Well before the rise of EVs, auto manufacturing jobs across the country were heavily concentrated in five states — Michigan, Ohio, Indiana, Kentucky and Alabama —

which between 2010 and 2015 made up 62% to 68% of U.S. motor vehicle manufacturing employment.

Distribution of motor vehicle manufacturing employment over the years



Note: Map displays annual average employment numbers for motor vehicle manufacturing (NAICS code: 3361) from the BLS Quarterly Census of Employment and Wages.

Source: WRI and BW analysis of Bureau of Labor Statistics (BLS) [data](#).



Now, after historic levels of private investments spurred by the 2022 Inflation Reduction Act, EV and battery manufacturing facilities are opening in different parts of the country, with 84% of announced private investments now located in 10 states: Georgia, Michigan, North Carolina, South Carolina, Tennessee, Nevada, Indiana, Kentucky, Ohio and Illinois.

While states with a strong auto-manufacturing presence are receiving significant EV-related investments, other states like Georgia, Nevada and Arizona, which have not historically been heavily associated with auto manufacturing, are now entering the EV-related manufacturing industry.

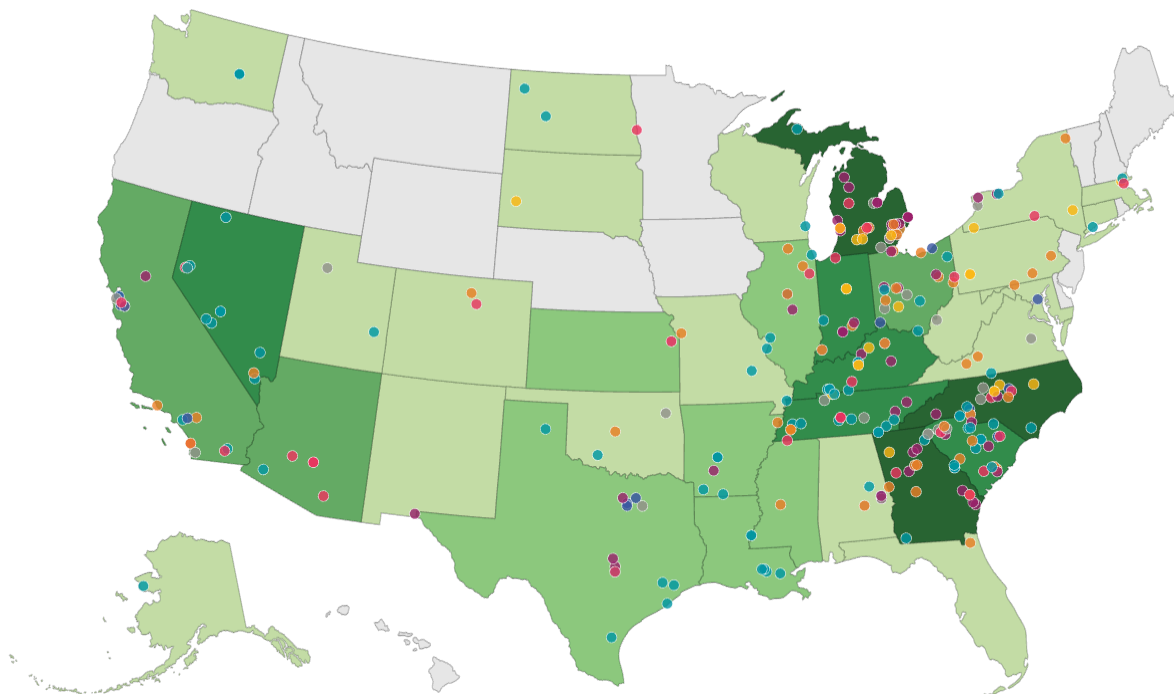
Georgia for instance, accounts for nearly 16% of recent EV-related manufacturing job announcements in the U.S. based on [data](#) from the U.S. Department of Energy, with a heavy presence of both vehicle and battery manufacturing facilities. Arizona and Nevada are becoming [more](#) involved in battery manufacturing where at least \$17 billion in [investments](#) have been announced for facilities operating in different parts of the battery supply chain.

Such trends indicate that EV and battery manufacturing may become more dispersed across a wider range of states compared to existing auto industry facilities and employers.

Announced private investments and facilities for electric vehicle, battery, and charger manufacturing

Announced private investments (\$ Billions) No investments <1 1-5 5-10 10-15 >15

Manufacturing facility type Batteries: Minerals, Materials, and Components Batteries: Cells Batteries: Packs
 Batteries: Cells and Packs Electric Vehicles: Components Electric Vehicles: Assembly Electric Vehicles: Chargers



Note: Map displays amounts of private investments and facilities announced for electric vehicle, battery, and charger manufacturing since January 2021. Many manufacturing facilities in DOE's dataset lack investment estimates as investment amounts were only compiled by the DOE if they were openly reported in public announcements. Facilities which lack investment data are not displayed.
 Source: WRI and BW Research analysis of U.S. DOE [data](#).



While provisions included in the Inflation Reduction Act, such as tax credits and grants like the [Domestic Manufacturing Auto Conversion Grants](#) are driving national investment in the EV industry, U.S. states are also competing with each other to attract those investments.

There are several factors that influence a company's decision to locate in one state versus another, but the availability of a skilled workforce is a key factor. Offering worker training support, including funding for training programs and dedicated training centers, is one way states are using incentives to attract companies. These employer-specific incentives can significantly reduce costs related to hiring and training workers. Georgia's [Quick Start](#) and South Carolina's [Ready SC](#) are two examples of worker training programs offered to large employers as part of the incentive package to lure them to those states. Ready SC is creating [customized training for AESC](#), the battery cell maker that will provide all the batteries for BMW's EV production line in Spartanburg, South Carolina. The program is also [building a new training center](#) near AESC's manufacturing site.

Other factors that could influence company location calculus include availability of state-level tax incentives, existing supply chain infrastructure and manufacturers and associated suppliers deciding to be in proximity to one another. For example, Hyundai's EV and battery manufacturing facility in Savannah, Georgia, which commenced construction in 2022, has helped [attract](#) more than 17 suppliers of vehicle components and metal parts into the state. Other regulatory aspects like "[Right-to-Work](#)" laws in different states may also influence decision-making. The [concentration of EV investments in such states](#) can make it harder for workers to collectively bargain for better pay and working conditions.

While existing investment and facility announcement patterns help identify states where EV manufacturing is becoming prominent across the country and where workers will be needed, it is important to note that some occupations, such as auto maintenance and repair technicians with training to work on EVs, will be needed across the country as EV ownership rises in different states. Similarly, although [private investments for charger manufacturing](#) are mainly occurring in a few states like Ohio, Texas, and

California, electricians and technicians who are trained to install and maintain chargers will also be in demand throughout the country as charging deployment increases.

2) The EV Industry Needs a Diverse Group of Educated and Trained Workers

The rapidly growing EV industry will need workers with a diverse set of skills and specialties making the industry accessible to a wide group of individuals with different educational and training backgrounds. They will be engaged in five key areas:

- 1) Scientific research to improve EV technology.
- 2) Design and development of EV technology.
- 3) EV and battery manufacturing.
- 4) EV maintenance and repair.
- 5) Charging infrastructure development.

Examples of EV-related occupations and their educational and training requirements

Occupation	Industry Segment	Typical Entry-Level Education	Typical On-The-Job Training	Previous Work Experience
Chemical Engineers	EV Design and Development	Bachelor's degree	None	None
Chemists	EV Design and Development	Bachelor's degree	None	None
Computer Occupations, All Other	EV Design and Development	Bachelor's degree	None	None
Computer Programmers	EV Design and Development	Bachelor's degree	None	None
Electrical Engineers	EV Design and Development	Bachelor's degree	None	None
Electronics Engineers, Except Computer	EV Design and Development	Bachelor's degree	None	None
Engineering Technologists and Technicians, Except Drafters, All Other	EV Design and Development	Associate's degree	None	None
Environmental Engineers	EV Design and Development	Bachelor's degree	None	None
Computer Hardware Engineers	EV Design and Development	Bachelor's degree	None	None
Commercial and Industrial Designers	EV Design and Development	Bachelor's degree	None	None
Industrial Engineers	EV Design and Development	Bachelor's degree	None	None
Materials Engineers	EV Design and Development	Bachelor's degree	None	None
Materials Scientists	EV Design and Development	Bachelor's degree	None	None
Mechanical Drafters	EV Design and Development	Associate's degree	None	None

While a doctoral degree is required for scientists who are conducting original research in improving battery technology and power electronics, for instance, other scientific workers in EV-related scientific research require only bachelor's or master's degree. Workers in design and development of EV technology are more likely to require bachelor's degree, though there are occupations that require an associate's degree.

Engineers — chemical, electrical, industrial, materials and mechanical — are one of the most sought-after workers and will typically enter the EV industry with a bachelor's degree. Certifications in specific systems and technologies and licensure as a professional engineer are also sought by employers for more senior level positions. Working closely with engineers are engineering technicians and drafters with an associate's degree or certification from a community college or a technical school.

EV manufacturing includes workers with a wide variety of skills. Many occupations only require a high school diploma but must be supplemented with on-the-job training or apprenticeship programs to familiarize workers with production processes and equipment they will use. Even though EVs and internal combustion engine vehicles have some important differences, many of the workers previously employed in traditional vehicle manufacturing [can move on to EV manufacturing](#) with appropriate retraining and reskilling. Care will have to be taken so that the high labor standards of traditional vehicle manufacturing, won through decades of union efforts, continue in the transition to new jobs in EV manufacturing.

Automotive technicians and mechanics will require formal training to deal with high-voltage electricity, high-tech software and mechanical parts within an EV. Training

begins in high school or post-secondary vocational school and community college. Certifications from the [National Institute for Automotive Service Excellence](#) (ASE), a nonprofit organization that tests and certifies auto mechanics and technicians, is typically required to work at large repair shops or dealerships.

Electrical workers set up EV charging stations in Detroit, Michigan, before an event announcing more fast charging stations between the U.S. and Canada. More trained workers will be needed as EV charging infrastructure is set up across the U.S. Photo by Jim West / Alamy Stock Photo.

Finally, charging infrastructure roll-out will require increasing numbers of electrical power-line installers and repairers who will install and maintain the electric grid to move electricity from generating plants to customers, as well as electricians who will install charging stations and related equipment for EVs. Both these occupations require a high school diploma with on-the-job training, and in the case of electricians, certifications and apprenticeship programs specializing in charger installations are emerging. The [Electric Vehicle Infrastructure Training Program](#), for instance, develops curriculum to train and certify electricians to perform installation and maintenance of charging stations.

3) Public-Private Partnerships Are Key to Training the Workforce

There is no comprehensive review yet of types and locations of post-secondary EV-related training programs that are emerging across the country, who those programs are serving and the extent to which these programs are meeting the goals of developing a diverse and inclusive workforce. [One analysis](#) by the National Association of State Energy Officials, the American Association of State Highway and Transportation Officials and Duke University's Nicholas Institute for Energy, Environment and Sustainability has identified 17 colleges and universities offering EV manufacturing training programs, 28 offering EV maintenance/service training programs and 14 offering EV-specific electrician and charging infrastructure training programs across 10 southeastern states. This analysis does not include training provided by employers or other stakeholders such as the [Clean Cities Coalition](#).

However, we were able to document several educational and training programs that target workers interested in the EV industry and have three observations:

- **A diverse range of EV training programs, including degree programs, certifications in specific systems and technologies, and apprenticeships, are emerging to build this workforce.**

A growing number of universities are expanding EV-related research and education, including the [Electric Vehicle Center](#) at the University of Michigan and University of Georgia's [Electric Mobility Initiative](#). Community colleges such as Illinois' [Heartland Community College](#) and Tennessee's [Chattanooga State Community College](#) are adding EV instruction to their existing associate degree program focused on automotive technology.

Beyond degree programs, technical or vocational schools, community colleges and professional organizations are developing certification programs, that last anywhere between a few months to two years and aim to prepare students to enter the EV industry as quickly as possible. Certifications are awarded after a student has passed the proper assessments administered by a recognized credentialing institution. North Carolina's [Wake Tech community college](#) offers an Electric Vehicle Supply Equipment (EVSE) Field Technician Certificate course that spans six weeks and provides online and hands-on instruction. Students successfully completing the course will receive a Wake Tech Certificate and be prepared to sit for EVSE Technician credentialing through the [Society of Automotive Engineers](#).

Apprenticeship programs also create a diverse pipeline of workers for the EV industry. These industry- or union-led training programs help individuals learn a trade or profession through a combination of classroom instruction and paid on-the-job experience. The training can vary in length from one to six years, depending on the complexity of the profession. [Rivian](#), for example, launched an apprenticeship program in 2023 to train staff for its future manufacturing plant in Georgia. Participants will attend Georgia community colleges for the first six months before completing another 12 to 18 months of on-the-job training at Rivian's existing plant in Illinois. Tuition will be covered by [Georgia's HOPE career grant program](#) and participants will be paid as maintenance technicians by Rivian while in the program.

- **Two-year community colleges and four-year universities have a significant foundation of education and training programs that can be built upon to meet the needs of the EV industry.**

Many universities offer engineering and computer science degree programs, which will be in demand as the EV industry grows. The U.S. Bureau of Labor Statistics estimates that [software developers](#) and [chemical engineers](#), two of the key in-demand EV-related occupations, will grow by 17% and 10% respectively from 2023 to 2033, much faster than the average for all occupations. The same projections estimate 140,000 openings for software developers, quality assurance analysts and testers each year, on average, over the decade. The EV industry will increasingly look to universities, especially in states where they have research and development and manufacturing facilities, for access to both cutting edge research to stay competitive and a workforce equipped with specialized skills and knowledge. [Wayne State University](#) in Michigan was ahead of the game when it became the first university in 2010 to launch an electric vehicle engineering curriculum.

Similarly, community colleges have a substantial knowledge base in automotive, welding, electrical and manufacturing technologies. These are versatile institutions that can provide transfer pathways to four-year universities, work certifications and career education programs. Because community colleges also disproportionately serve students of color and low-income students, they offer significant opportunity to build a diverse workforce. The EV industry is already forging strategic partnerships with community colleges (see [Tesla Start Program](#)) but community colleges [need more public funding](#) and support to offer EV-related training programs.

- **Many EV-related training programs have an industry partner.**

While the private sector knows best the skills it requires in its workforce, it will need to partner

with universities and community colleges, through internships, joint research initiatives and apprenticeship programs, to train the EV workforce. Some of that is already happening. Tesla and Panasonic have teamed up with the American Association of Community Colleges to create an apprenticeship program to meet the demand for workers in charging infrastructure. This national initiative is funded by an \$8 million grant from the Department of Labor. However, more coordinated effort between companies and the training providers in balancing the supply and demand for workforce-ready students is needed, especially since research has found that a disconnect exists between the skills companies need their workers to have and the skills taught by community colleges, for instance.

More Research and Collaboration Can Create a Diverse EV Workforce

The U.S. automotive industry is undergoing a profound transformation in the transition to EVs that will require training providers to adapt and keep up with industry changes. Technological changes within the battery industry, such as manufacturers shifting to novel battery chemistries and designs, will also impact training needs. How quickly EV adoption increases and how prominent different vehicle types, such as hybrids, become in the future are some other factors which will impact how and when training needs evolve.

One thing is very clear though: Successfully navigating the training needs of this dynamic industry landscape will require more research to better understand how the industry is evolving. For example: How are employers defining their workforce needs? How well are available training programs matching industry needs in different locations? What extents are training programs creating a diverse workforce?

Close collaboration between different stakeholders like training providers, employers, policymakers and labor and community organizations will also be critical to ensure suitable training programs are available and accessible in different locations across the country.

Relevant Work

CLIMATE

US States Are Creating a Pipeline of Trained EV Workers — Here Are the Emerging Trends

Insights JANUARY 9, 2025

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Navigating the EV Transition: 4 Emerging Impacts on Auto Manufacturing Jobs

Insights JUNE 13, 2024

ENERGY

How US Auto Workers Can Thrive in the Transition to Battery Electric Vehicles

Technical Perspectives NOVEMBER 13, 2025

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EVs Could Create Thousands of Jobs in Michigan and Revitalize Its Auto Industry

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Projects

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