

**BUILDING A WORKFORCE
TO NAVIGATE THE ELECTRIC
VEHICLE FUTURE**

FIELD HEARING
BEFORE THE
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY
OF THE
COMMITTEE ON SCIENCE, SPACE,
AND TECHNOLOGY
OF THE
HOUSE OF REPRESENTATIVES
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**BUILDING A WORKFORCE TO NAVIGATE
THE ELECTRIC VEHICLE FUTURE**

FRIDAY, MAY 20, 2022

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Subcommittee met, pursuant to notice, at 10:15 a.m., in the Oakland County Commission Chambers, 1200 Court Tower Boulevard, Pontiac, Michigan 48341, Hon. Haley Stevens [Chairwoman of the Subcommittee] presiding.

**U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HEARING CHARTER**

Building a Workforce to Navigate the Electric Vehicle Future

**Friday, May 20, 2022
10:00 am – 12:00 pm ET
Oakland County Commission Chambers
1200 Court Tower Boulevard, Pontiac, Michigan**

PURPOSE

This hearing is an opportunity for members to explore the workforce needs for the automotive mobility and electrification industry in order to position the United States at the center of growth for electric vehicles (EVs). Members will explore issues facing workers across the emerging EV ecosystem, including design, manufacturing, installation, and maintenance of EVs and charging infrastructure. Witnesses will provide insights and strategies for meeting clean energy goals while bolstering national competitiveness and ensuring shared prosperity for American workers.

WITNESSES

- **Ms. Marcia Black-Watson**, Industry Engagement Division Administrator, Workforce Development, Michigan Department of Labor and Economic Opportunity
- **Ms. Jennifer Mefford**, National Co-Chair, Electric Vehicle Infrastructure Training Program (EVITP)
- **Mr. Benigno “Ben” Cruz**, Director, Center for Advanced Automotive Technology (CAAT), Macomb Community College
- **Mr. Josh Nassar**, Legislative Director, United Auto Workers (UAW)

KEY QUESTIONS

- What is the state of the U.S. EV workforce? What are the types of EV skills and competencies in highest demand? What, if any, skills shortages have EV manufacturers experienced?
- What are promising approaches to providing the education and skills training workers need to meet the evolving needs of the EV sector?
- What challenges are auto workers facing as the industry shifts to a larger focus on EVs and what is needed to mitigate these challenges?

BACKGROUND

Electric motors and battery packs distinguish electric vehicles (EVs) from conventional internal combustion engine (ICE) vehicles. The battery pack provides all or part of the power to the motor that

drives the vehicle. The motor intermittently acts as a generator, sending electricity back to the battery. EVs can be separated into three broad categories:

- Hybrid-electric vehicles (HEVs): The ICE primarily powers the wheels. The battery pack and electric motor provide supplemental power.
- Plug-in hybrid-electric vehicles (PHEVs): The battery pack can be charged by an external source of electricity. Depending on the model, primary power to the wheels may be supplied by the battery pack and electric motor, the internal combustion engine, or a combination.
- All-electric vehicles (AEVs; also called battery-electric vehicles or BEVs): The battery pack must be charged via an external source of electricity. The battery pack and electric motor power the wheels.

Climate Change Mitigation

According to the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report, “On-road passenger and freight vehicles dominate global transport-related CO₂ emissions and offer the largest mitigation potential.”¹ The report includes several potential scenarios for improvements in transportation and their projected reduction in greenhouse gas emissions. On average, the scenarios indicate that the carbon intensity of the transportation sector would need to decrease by about 50% by 2050 and as much as 91% by 2100 when combined with a cleaner electricity grid to stay within the 1.5-degree Celsius (2.7 Fahrenheit) target for global warming. Electric passenger vehicles hold the most potential for mitigation, with PHEVs providing the greatest emission reduction compared with HEVs and BEVs due to the possibility of charging the battery with low-carbon electricity and the longer full-electric range.

EV Production

Conventional ICE vehicles continue to make up the bulk of industry production, but a growing share of the auto sector works on EV technology.² In 2019, global sales of electric cars totaled 2.2 million, about 2.5% of global car sales. In 2020, electric vehicles accounted for 4.1% of total car sales. In 2021, electric vehicle sales doubled again to 6.6 million, representing almost 9% of total car sales.³ This aggressive growth is taking place in the United States as well as abroad. EV sales doubled in the United States from 308,000 in 2020 to 608,000 in 2021.⁴ For context, internal combustion engine car sales grew by just 2.8% in the same period. S&P Global Platts Analytics projects that global EV sales will soar another 400% by 2030.⁵ The explosive commercial uptake of electric vehicles has been enabled in large part by the falling costs of batteries. Battery cells saw an 89% cost reduction in the last decade, falling from an average of \$1,200/kWh in 2010 to \$132/kWh in November 2021.⁶

¹ <https://www.ipcc.ch/report/ar6/wg3/>

² <https://www.energy.gov/sites/default/files/2021-07/USEER%202021%20Main%20Body.pdf>

³ <https://www.ica.org/commentaries/electric-cars-fend-off-supply-challenges-to-more-than-double-global-sales>

⁴ <https://www.energy.gov/energysaver/articles/new-plug-electric-vehicle-sales-united-states-nearly-doubled-2020-2021>

⁵ <https://www.spglobal.com/commodity-insights/en/market-insights/latest-news/energy-transition/021622-global-light-duty-ev-sales-to-rise-to-268-mil-by-2030-platts-analytics>

⁶ <https://about.bnef.com/blog/battery-pack-prices-fall-to-an-average-of-132-kwh-but-rising-commodity-prices-start-to-bite/>

EV Workforce

The automobile industry represents a significant segment of the U.S. labor force, employing almost 3 million Americans in auto dealerships and manufacturing.⁷ Almost 1 million Americans work in motor vehicle and motor vehicle components manufacturing alone,⁸ with roughly three-quarters of autoworkers employed in auto parts and one-quarter working in assembly.⁹ The auto industry has grown steadily since the Great Recession, bringing back almost 360,000 manufacturing jobs since mid-2009.¹⁰ While the COVID-19 crisis resulted in significant job loss, with auto manufacturing employment down by more than 30% in May 2020 compared with May 2019, employment has since largely recovered to pre-pandemic levels.¹¹

The emerging EV workforce includes workers from a variety of educational and employment backgrounds, such as the research scientists and engineers who study electric drive technology, the manufacturing workers who build the vehicles, and the maintenance technicians who repair the vehicles. Many of the workers employed in the design, manufacture, repair, and maintenance of electric vehicles are those who have worked in similar roles for ICE vehicles. As electric vehicles become more prevalent, new occupations with unique skill sets are emerging, resulting in the need for specialized training.

Research: Research scientists and engineers in the EV industry conduct research to improve electric vehicle technology. For example, both chemists and materials scientists conduct research on improving battery life and recharging time. Materials scientists also research and develop new materials for use in electric vehicles.¹²

Design and Development: Workers who design and develop EV technology include engineers and engineering technicians, software developers, and industrial designers. Engineers design, test, and integrate components to produce designs for new products. Following the design phase, engineers evaluate design effectiveness, cost, reliability, and safety.¹³

Specialized programs for engineering students pursuing EV careers are available at the Department of Energy (DOE) Graduate Automotive Technology Education (GATE) Centers of Excellence.¹⁴ DOE also sponsors a collegiate experimental learning competition, called the ECOCar EV Challenge, for students to develop and demonstrate innovative battery technologies for EVs.¹⁵ Another DOE initiative, the Clean Energy Innovator Fellowship Program, place recent graduates in industry or government clean energy programs for hands-on learning and professional development.¹⁶

⁷ <https://www.bluegreenalliance.org/wp-content/uploads/2018/09/Electric-Vehicles-At-a-Crossroads-Report-vFINAL.pdf>

⁸ <https://www.bls.gov/iag/tgs/iagauto.htm>

⁹ <https://www.nelp.org/wp-content/uploads/2015/03/Manufacturing-Low-Pay-Declining-Wages-Jobs-Built-Middle-Class.pdf>

¹⁰ https://data.bls.gov/timeseries/CEU3133600101?amp%253bdata_tool=XGtable&output_view=data&include_gra

¹¹ <https://www.bls.gov/iag/tgs/iagauto.htm>

¹² https://www.bls.gov/green/electric_vehicles/#occupations

¹³ https://www.bls.gov/green/electric_vehicles/#occupations

¹⁴ <https://www.energy.gov/eere/vehicles/vehicle-technologies-office-graduate-automotive-technology-education-gate>

¹⁵ <https://www.energy.gov/articles/doe-announces-15-universities-selected-ecocar-electric-vehicle-challenge>

¹⁶ <https://www.energy.gov/eere/articles/doe-announces-clean-energy-innovator-fellowship-program-help-build-diverse-us>

Manufacturing: Manufacturing EVs is a complex process that requires a skilled workforce. Many of the workers involved in the manufacture of EVs have previously worked in conventional ICE vehicle manufacturing. Skilled technical manufacturing jobs in the EV industry include various assemblers, machine tool operators, and machinists.¹⁷ Automotive manufacturing occupations tend to be geographically clustered around industrial centers in the Great Lakes region and the Midwest, with the largest concentration of jobs in Michigan and Ohio.

Repair and Maintenance: As with any vehicle, electric vehicles require regular maintenance and occasionally need to be repaired. Much of the routine maintenance and repair work can be done by traditional automotive repair workers, but the electrical systems and drivetrain often require skilled workers with experience and training on those components.¹⁸

Community colleges play a central role in expanding the skilled technical workforce for the manufacture, repair, and maintenance of EVs. Community colleges engage with local industry to identify the skills and training in high demand and to tailor curriculum to meet the industry's evolving needs. Community colleges also engage with universities to enable students to pursue EV career pathways that require advanced degrees.

The National Science Foundation (NSF) Advanced Technological Education (ATE) program provides funding to community colleges to develop innovative education and training programs for skilled technicians working in all sectors, including EVs.¹⁹ The Center for Advanced Automotive Technology (CAAT) at Macomb Community College in Warren, Michigan is an active ATE Center of Excellence and a leader in EV workforce training.²⁰

Infrastructure: As the number of EVs on the road increases, the need for charging stations will grow. Most of these chargers will be in the homes of EV owners or in public charging stations. Electricians install charging stations and other equipment needed for EVs. They attach the charging stations to lines that have been installed by electrical power-line installers and ensure that the chargers are working properly. When there is a problem with the charger, electricians are called to make necessary repairs.

Electricians must go through a 3-year apprenticeship during which they receive formal classroom instruction as well as on-the-job training from an experienced electrician. In addition, most states and localities require an electrician to be licensed, which typically involves passing an examination. Before electricians can be certified to install an EV charging station, they are required to go through specialized training.

The Electric Vehicle Infrastructure Training Program (EVITP) was developed in 2011 in response to the demand for qualified individuals who were skilled in the installation and maintenance of EV supply equipment (EVSE) infrastructure. Developed by a consortium of public and private industry organizations and associations, EVITP is a non-profit national training and certification program that trains licensed or

¹⁷ https://www.bls.gov/green/electric_vehicles/#occupations

¹⁸ https://www.bls.gov/green/electric_vehicles/#occupations

¹⁹ <https://beta.nsf.gov/funding/opportunities/advanced-technological-education-ate>

²⁰ <http://autocaat.org/Home/>

certified electricians on the specialized requirements of EVSE installation and maintenance to support EVs.²¹

EV Workforce Challenges

Displacement: A shift to EVs could result in a reduction in job opportunities for autoworkers. EV powertrains have fewer moving parts than ICE powertrains. This simplicity could significantly reduce the amount of labor necessary for vehicle production, maintenance, and repair, particularly for engines, transmissions, exhaust systems, and fuel systems.

Additionally, the U.S. has a relatively limited domestic capacity to produce EV powertrain components compared with conventional engines and transmissions. Rapid, large-scale adoption of EVs could lead to fewer domestic automotive jobs, because currently a large share of powertrain components is supplied by producers in Europe and China. According to an Economic Policy Institute analysis, without a significant boost to domestic EV manufacturing capacity, a 50% market penetration of EVs by 2030 could result in a loss of 33,000 auto parts jobs. However, if the U.S.-produced share of EV powertrain components were increased to equal that of conventional vehicles, the loss of auto parts jobs in the same market penetration scenario could be reduced dramatically (to 2,500).²² The study also assessed a third scenario, in which U.S. produced share of EV powertrain components matched that of conventional vehicles and the share of domestically produced vehicles sold in the U.S. increased by 10%. In this scenario, a 50% market penetration of EVs would lead to the creation of 150,000 new auto parts jobs. The study concluded that boosting domestic capacity in EV technology manufacturing and vehicles sales is essential to mitigate a dramatic degradation of job opportunities for U.S. autoworkers.

As employers and policymakers embrace increased adoption of EVs, worker advocates are raising alarms about the potential negative impacts for autoworkers. Organizations like United Auto Workers (UAW) are calling for a commitment to re-tooling existing plants, re-training incumbent autoworkers, and ensuring new EV components are manufactured in the U.S.²³

Job Quality and Access: While high rates of unionization have historically helped ensure that auto sector jobs provided a pathway to the middle class, today, job quality varies significantly among U.S. autoworkers. Some autoworkers still earn in the range of \$20 to \$30 per hour and high-quality benefits. Yet many of the jobs created in the past decade are nonunion or temporary positions, which come with lower wages and benefits as well as fewer job protections.²⁴ While automotive manufacturing is more representative of Black workers than are other parts of the manufacturing sector, Hispanic, Asian, and female workers remain underrepresented in motor vehicle manufacturing.²⁵

²¹ <https://evitp.org/>

²² <https://www.epi.org/publication/ev-policy-workers/>

²³ <https://uaw.org/wp-content/uploads/2019/07/190416-EV-White-Paper-REVISED-January-2020-Final.pdf>

²⁴ <https://www.epi.org/publication/ev-policy-workers/>

²⁵ <https://www.bls.gov/cps/cpsaat18.htm>

Federal Government Actions

In the first year after taking office, President Biden issued two executive orders to spur large-scale adoption of EVs: one to transition the approximately 600,000 cars and trucks in the federal fleet to zero-emission light-duty vehicles by 2027²⁶ and the other to set a target of 50% EV sales share by 2030. The bipartisan *Infrastructure Investment and Jobs Act* (P.L. 117-58), signed into law in November 2021, includes \$7.5 billion for electric vehicle charging stations and establishes a National Electric Vehicle Infrastructure (NEVI) Formula Program to support State projects.²⁷

The Department of Transportation (DOT) partnered with the Department of Energy (DOE) to announce in 2022 that the NEVI Formula Program will provide nearly \$5 billion over five years to help States create a network of EV charging stations along designated alternative fuel corridors.²⁸ Further, a separate competitive grant program designed to increase EV charging access, including in rural and underserved communities, is set to be announced later in 2022.

Michigan expects to receive \$110 million of the NEVI Formula Program funds.²⁹ The state has partnered with its Midwestern neighbors to form a coalition focused on a regional network of charging stations and has launched a workforce development initiative to prepare residents for jobs in the EV industry.³⁰ The National EV Charging Action Plan, released in December 2021³¹, outlines steps federal agencies are taking to support developing and deploying EV chargers in American communities across the country. Elements of the Action Plan include:

- **Joint Office of Energy and Transportation.** In December 2021, the Biden Administration established a Joint Office of Energy and Transportation, leveraging the resources of DOE and DOT.³² The Joint Office is tasked with ensuring agencies can work together to implement the EV charging network and other electrification provisions in the law and providing a “one-stop-shop” for resources on EV charging and related topics.³³
- **Stakeholder input.** The White House convened a series of stakeholder meetings on topics including partnerships with state and local government, domestic manufacturing, equity, environmental justice, and maximizing environmental benefits. DOT and DOE are working to assemble a new Advisory Committee on Electric Vehicles, although the target date (end of FY22 Q1), for the appointment of this Committee has passed.

²⁶ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/08/fact-sheet-president-biden-signs-executive-order-catalyzing-americas-clean-energy-economy-through-federal-sustainability/>

²⁷ <https://www.congress.gov/bills/117/congress/house-bill/3684/text>

²⁸ <https://highways.dot.gov/newsroom/president-biden-usdot-and-usdoe-announce-5-billion-over-five-years-national-ev-charging>

²⁹ [https://www.michiganbusiness.org/press-releases/2022/02/whitmer-announces-michigan-will-receive-\\$110-million-expand-electric-vehicle-charging-infrastructure/](https://www.michiganbusiness.org/press-releases/2022/02/whitmer-announces-michigan-will-receive-$110-million-expand-electric-vehicle-charging-infrastructure/)

³⁰ <https://www.michigan.gov/whitmer/news/press-releases/2021/09/22/governor-whitmer-launches-two-initiatives-to-advance-michigans-ev-infrastructure-and-workforce-land>

³¹ <https://www.whitehouse.gov/briefing-room/statements-releases/2021/12/13/fact-sheet-the-biden-harris-electric-vehicle-charging-action-plan/>

³² <https://www.energy.gov/articles/doe-and-dot-launch-joint-effort-build-out-nationwide-electric-vehicle-charging-network>

³³ <https://driveelectric.gov/>

- **Guidance and Standards for States and Cities.** In February 2022, DOT released an updated guide to deploying EV charging stations strategically to build out a national network along the highway system.³⁴ In the coming weeks, DOT is expected to publish standards for EV chargers in the national network to ensure they work, they're safe, and they're accessible to everyone. In April 2022 DOE announced a Vehicle to Everything (V2X) Memorandum of Understanding (MOU) that will leverage resources from DOE, DOE national labs, state and local governments, utilities, and industry to examine technical and economic feasibility of bidirectional charging into the electrical grid.³⁵ This announcement incorporated input received through a June 2021 RFI.³⁶
- **Requesting Information from Domestic Manufacturers.** In November, DOT and DOE released a request for information from domestic manufacturers to identify EV chargers and other charging related components that meet USDOT Buy America requirements and to highlight the benefits of shifting all manufacturing and assembly processes to the United States.³⁷
- **New Solicitation for Alternative Fuel Corridors.** In 2015, Congress passed the *Fixing America's Surface Transportation (FAST) Act* (P.L. 114-94), which required DOT to establish a national network of Alternative Fuel Corridors that built fueling and charging stations for vehicles powered by alternative fuels. In 2016, DOT announced its first wave of these corridors spanning 35 states. DOT has since designated 4 additional rounds. These corridors now span 49 states and approximately 165,000 miles of highway. The deadline for submissions for the sixth-round corridor designations was May 13, 2022.³⁸

³⁴ https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/90d_nevi_formula_program_guidance.pdf

³⁵ <https://www.energy.gov/technologytransitions/articles/department-energy-announces-first-its-kind-collaboration-accelerate>

³⁶ <https://www.energy.gov/eere/articles/energy-department-releases-request-information-electric-vehicle-grid-integration>

³⁷ <https://www.federalregister.gov/documents/2021/11/24/2021-25717/buy-america-request-for-information>

³⁸ https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/nominations/2022_request_for_nominations_r6.pdf

Chairwoman STEVENS. This hearing will come to order. Without objection, the Chair is authorized to declare recess at any time.

Before I deliver opening remarks, I wanted to note that today's Committee hearing is meeting both in person and virtually, today's Committee hearing from the Science, Space, and Technology Committee of the House of Representatives Subcommittee on Research and Technology. Just a couple of reminders for Members about the conduct of this hearing. First, Members and Committee staff who are attending in person may choose to be masked. It is obviously not a requirement. However, any individuals with symptoms, a positive test, or exposure to someone with COVID-19 should wear a mask while present.

Members who are attending virtually should keep their video feed on as long as they are present for the hearing. Members are responsible for their own microphones. Please also keep your microphones muted unless you are speaking. Finally, if Members have documents they wish to submit for the record, please email them to the Committee Clerk, whose email address was circulated prior to the hearing.

And a special thank you to House Science Committee professional staff for traveling from Washington, D.C., to Oakland County, Michigan, for today's hearing, setting up the virtual component, as well as the physical component of today's hearing.

So good morning. It is so exciting to be gathered here in Pontiac, Michigan, at the Oakland County Commission Chambers. I am delighted to host today's hearing as your Subcommittee Chair for Research and Technology, and I extend a warm welcome and thank you to my esteemed colleagues and our distinguished panel of witnesses, certainly, my colleague Congresswoman Debbie Dingell, who has been a champion and a dealmaker of the subject matter at hand, the electric vehicle (EV) workforce.

I also want to extend my gratitude to the Oakland County Board of Commissioners. We are joined here today by Commissioner Gwen Markham, but the whole Board of Commissioners who has let us use their space, their convening space, and certainly want to also offer up a special appreciation to Oakland County Executive Dave Coulter and Oakland County Commissioner Chair David Woodward for their leadership not only for our county but again for the subject matter at hand, how we are going to win the future.

We are here today to examine how to build a workforce to navigate the electric vehicle future. Michigan has been at the forefront, as we well know, of automotive innovation for generations. Not only did we put the world on wheels a century ago at the beginning of the 20th century, but an entire innovation ecosystem sprung up around transformative mobility.

So let's be clear. Michigan has led the way as the first State to complete a border-to-border interstate in 1960, the home to the first four-way electric traffic light installed not far from here in Detroit in 1918. The first highway materials testing lab in the Nation was opened in Ann Arbor in 1912, and General Motors (GM) produced the first modern electric automobile in 1996.

Now, our automotive companies, Ford, General Motors, Stellantis, along with a remarkable supply chain that surrounds us here today in Oakland County, Michigan, are leading the world in

electric vehicle technology and the innovation ecosystems that are at the very backbone of the country's economy.

As many of you know, chief among my priorities is to champion our manufacturing economy and its workforce in the halls of Congress. I've sought to understand challenges facing local manufacturers, keep my finger on the pulse of their needs through what I call Manufacturing Monday, my Manufacturing Monday visits. Every week, I get the opportunity to see the very innovation in the electric vehicle space that is happening in our own backyard from Allison Transmission's facility in Auburn Hills and Continental to Intecells reshaping battery manufacturing technology in Troy to One Next Energy in Novi, many of the guests before us here today paying witness to today's hearing either virtually or in person here in the Oakland County Commission Chambers. The opportunities, my friends, are right here.

So not only has southeast Michigan been at the forefront of industry, we have also had the enthusiasm for electric vehicle—for an electric vehicle future from local leaders hungry to become a part of the solution to a cleaner environment, communities like Troy, Royal Oak, Berkley, Canton, and Ferndale—we're joined here today by Ferndale's Mayor Melanie Piana—are taking great strides to be the early adopters needed to support the development and deployment of an electric vehicle infrastructure, all of which will be fueled by Michigan's workforce.

Michigan remains the preeminent automotive manufacturing hub in our Nation. Our discussion today will focus on a vital element of continuing this leadership, the workforce. Because let's be clear, we can develop the most cutting-edge battery technology in the world, but that innovation only translates into economic and environmental benefits through the work of talented men and women who make it happen on the factory floor and in our communities as they're setting up the infrastructure.

Our panel today includes representatives from the Michigan Department of Labor and Economic Opportunity (LEO), as well as Macomb Community College, home of the Center for Advanced Automotive Technology (CAAT), a National Science Foundation-funded Advanced Technological Education center. They are doing extraordinary work to prepare a workforce to power the electric vehicle future. Many autoworkers have spent their entire career in the field and are experts in what they do, so I'm also very honored to have the United Auto Workers (UAW) here to discuss paths that ensure the transition to electric vehicles that is good for the environment and good for workers. We can't say that enough.

We cannot discount workers or see them cut out of the deal. We cannot see Michigan plants close at the expense of new and proliferating technology. Oh, no, my friends, it will be exactly the opposite. It needs to be more work and better jobs and something that can be led by our friends in labor.

Manufacturing electric vehicles is just one of an electric—one element of an electric vehicle future. The bipartisan *Infrastructure Investment and Jobs Act*, which I was proud to vote for and was signed into law just last November, provides \$7.5 billion, \$7.5 billion to develop the electric vehicle charging infrastructure with the goal of installing 500,000 public chargers nationwide by 2030. The

communities I mentioned here in Oakland County are ripe and ready for that investment. Michigan will lead the way.

To meet these goals, we'll need a highly trained workforce, though, capable of installing and maintaining these charging stations. Unfortunately, we may be faced with labor shortage of qualified electricians right here when we need them most. But we have heard from stakeholders throughout southeastern Michigan. We've heard from our friends in IBEW (International Brotherhood of Electrical Workers). Thirty-five percent of this workforce is retirement ready and may leave in the next 5 to 7 years.

So I'm excited to hear more about the gold standard for training electricians in the EV sector and the Electric Vehicle Infrastructure Training Program (EVITP). There is a story to tell coming out of southeastern Michigan that, despite a pandemic and shutdowns and at times a stymied workforce because of COVID-19, we never stopped, my friends. We never stopped responding to PPE (personal protective equipment) shortages or supply chain disruptions facing American consumers. In fact, while the auto industry sourced and produced PPE and ventilators, we continued innovating on the electric vehicle front and the products and demand around the world.

Has it been easy? With a semiconductor and chip shortage, certainly not. Do we still need to tackle that issue? Absolutely, we do. But today, we are setting the stage from Oakland County. We will remember this hearing and the incredible words and recommendations of our witnesses. What we discover, inquire, and capture here today will not only be for memory, it will be etched in the congressional record as part of our ongoing legislative body of work, how will electric vehicle shape our workforce and how will our workforce lead?

[The prepared statement of Chairwoman Stevens follows:]

Good morning. It is so exciting to be gathered here in Pontiac, Michigan at the Oakland County Commission Chambers. I'm delighted to host today's hearing and extend a warm welcome and thank you to my esteemed colleagues and our distinguished panel of witnesses. I'd also like to extend my gratitude to the Oakland County Board of Commissioners for letting us use their space—and offer up my special appreciation to Oakland County Executive David Coulter and Commissioner David Woodward for their leadership.

We are here today to examine how to build a workforce to navigate the electric vehicle future. Michigan has been at the forefront of automotive innovation for decades. Not only did we put the world on wheels at the beginning of the 20th century with automobiles, but an entire innovation ecosystem sprung up around this transformative kind of mobility. And let's be clear, it was Michigan leading the way. As the first state to complete a border-to-border interstate in 1960, the home to the first four-way electric traffic light installed not far from here in Detroit in 1918. The first highway materials testing lab in the Nation was opened in Ann Arbor in 1912. And General Motors produced the first modern electric automobile in 1996.

Now, our auto companies—Ford, General Motors and Stellantis, along with our remarkable supply chain—are leading the world in electric vehicle technology and the innovation ecosystems that are the very backbone of our Midwestern regional economy. As many of you know, chief among many priorities of mine is to champion our manufacturing economy and its workforce in the halls of Congress. I've sought to understand the challenges facing local manufacturers through what I call my Manufacturing Monday visits. Every week, I see the innovation in the electric vehicle space that is happening right in our own backyard. From Allison Transmission Facility's in Auburn Hills to Intecells reshaping battery manufacturing technology in Troy to One Next Energy in Novi. The opportunities are right here.

Not only has Southeast Michigan been at the forefront of this industry, but we also have the enthusiasm for the electric vehicle future from local leaders—hungry to become a part of the solution to a cleaner environment. Communities like Troy, Royal Oak, Berkley, Canton, and Ferndale are taking great strides to be the early

adopters needed to support the development and deployment of electric vehicle infrastructure. All of which will be fueled by Michigan's workforce.

Michigan remains the preeminent automotive manufacturing hub in our country. Our discussion today will focus on a vital element of continuing this leadership—the workforce. Because let me be very clear—we can develop the most cutting-edge battery technology in the world, but that innovation only translates into economic and environmental benefits through the work of talented men and women who make it happen on the factory floor.

Our panel today also includes representatives from the Michigan Department of Labor and Economic Opportunity as well as Macomb Community College, home of the Center for Advanced Automotive Technology, a National Science Foundation funded Advanced Technological Education Center. They are doing extraordinary work to prepare a workforce to power the electric vehicle future. Many auto workers have spent their entire career in the field and are experts at what they do. I'm happy to have the United Auto Workers here to discuss paths that ensure the transition to electric vehicles is good for the environment, and is good for workers. We cannot discount workers or see them cut them out of the deal. We cannot see Michigan plants close at the expense of new and proliferating technology. It needs to be the opposite: more work and better jobs, and something that can be led by our friends at labor.

Manufacturing electric vehicles is just one part of an electric vehicle future. The bipartisan *Infrastructure Investment and Jobs Act*, which I was proud to vote for and was signed into law in November, provides 7.5 billion dollars to develop the electric vehicle charging infrastructure with the goal of installing 500,000 public chargers nationwide by 2030.

To meet these goals, we will need a highly trained workforce capable of installing and maintaining these charging stations. Unfortunately, we may be faced with a shortage of these qualified electricians right when we need them the most. We have heard from stakeholders that in Southeast Michigan, about 35% of this workforce is retirement-ready and may leave in the next 5 to 7 years. I'm excited to hear more about the gold standard for training electricians in the EV sector, the Electric Vehicle Infrastructure Training Program.

There is a story to tell coming out of Southeastern Michigan that despite a pandemic and shutdowns and an at times stymied workforce, we never stopped. We never stopped responding to PPE shortages or supply chain disruptions facing American consumers. In fact, while the auto industry sourced and produced PPE and ventilators, we continued innovating electric vehicles and the products in demand around the world. Has it been easy with semiconductor/chip shortages? No. Do we still need to solve that problem: absolutely. But today, we are setting the stage from Oakland County. We will remember this hearing and the incredible words of our witnesses. What we discover, inquire and capture here today will not only be remembered, it will be etched into the Congressional Record as part of our ongoing legislative body of work. How will EV's shape our workforce and how will our workforce lead?

Before I introduce our witness, I'd like to ask unanimous consent to enter into the record a letter of support from Canton's Supervisor, Anne-Marie Graham-Hudak, highlighting the importance of today's field hearing for local governments in Michigan. Her letter outlined the creative ways Canton is partnering with SEMCOG to apply for electric vehicle chargers funding through the bipartisan infrastructure bill and the workforce necessary to maintain and install chargers. I would like to thank her for submitting a letter and for her passion on this topic.

Chairwoman STEVENS. So before I introduce our witnesses, I would like to ask for unanimous consent to enter into the record a letter of support from one of Michigan's 11 very own Township Supervisors, Canton Township Supervisor Anne-Marie Graham-Hudak, highlighting the importance of today's field hearing for local governments in Michigan. Her letter outlined the creative ways Canton is partnering with SEMCOG (Southeast Michigan Council of Governments) to apply for electric vehicle chargers funding for the bipartisan infrastructure bill and the workforce necessary to maintain and install chargers. So I'd like to thank Canton Township Supervisor Graham-Hudak for submitting a letter and for her passion on this topic.

And at this time I would like to turn to Congresswoman, my friend, Debbie Dingell, who will also give an opening statement. Thank you.

Mrs. DINGELL. Thank you, Chairman Stevens, for inviting me and holding today's important field hearing to examine the electric vehicle workforce needs that industry is facing. Lawmakers need to understand it as we begin the transformational shift toward electrifying the transportation sector. If we are to be successful and continue our global leadership in building the vehicles of the future right here in Michigan, we will need a strong American workforce.

I've always been a car girl. I'm proud of it. Now I'm an EV car girl, and I'm very proud of the fact that Michigan put the world on wheels 100 years ago, and I want to make sure that the United States and Michigan stays at the forefront of innovation and technology worldwide and continues to be the mobility leader.

The future of the auto industry is electric. We know this. Michigan has been leading the way on this front. Ford, headquartered in Dearborn, Michigan, recently announced a new global battery center in southeast Michigan and not only unveiled the all-electric F-150 Lightning but is committed to doubling down on its production to meet demands.

General Motors finally I mean, I'm, very—what we want to do is be bringing these battery plants to Michigan, and it took losing two Ford plants to, I think, wake up the Michigan community that we want to make sure we are not losing those plants. And General Motors will be, very excitingly, locating their next battery plant in Oakland County where it really matters. Stellantis is doing the same kind of work. A lot of people are looking at locating the kind of work that we want to keep here in Michigan.

I was very proud last year just—it was last August—to stand at the White House with the President, all of the OEMs (original equipment manufacturers), all of the environmentalists, and the union presidents as the President announced an ambitious new target to make half of all new vehicles sold in 2030 zero-emission vehicles. And by the way, that came about as the results of a lot of hard work, the environmentalists and the union sitting down at a table, each talking about their issues, talking about their concerns, understanding each other's concerns, and working together to find solutions to where the issues were going to be.

With this landmark announcement and with more and more EVs expected to hit the road over the coming years, it's critical we're getting the policies right so this transition is swift and supports a strong American-built workforce.

I was at Region 1A, the UAW, with a cross-section of UAW workers at Region 1A about a month ago, and interestingly, the No. 1 issue and the only issue that most of them wanted to talk about was training the workforce for the future, how people were going to need skills, how these were complex vehicles. People used to be worried and I think there's still some anxiety that as you go from the internal combustion engine to an electric vehicle, will there be fewer jobs? There will be new jobs, different jobs, and the workers want to make sure that they're going to be trained themselves and that there will be workers that are going to be trained to work there with them. That's very important.

So that's why today's field hearing is so important. The EV workforce is essential to the future of this country, and what better place for a field hearing than the home of where it all began. Thank you, Madam Chair, and I yield back.

[The prepared statement of Chairwoman Johnson follows:]

Good morning and thank you to Chairwoman Stevens for holding today's hearing. I look forward to a fruitful discussion about the workforce needs that must be addressed in order to usher in a bright future for the electric vehicle industry.

Building a STEM (science, technology, engineering, and mathematics) workforce equipped to meet the needs of this country's emerging industries is an urgent national challenge. The Committee on Science, Space, and Technology has worked tirelessly over the past two years to develop important provisions that have been included in the *America COMPETES Act*. This landmark bill will accelerate progress on key emerging technologies like quantum computing, artificial intelligence, biotechnology, and clean energy technologies that power electric vehicles. These technologies have the potential to launch entirely new industries. They will help address pressing societal challenges like climate change. They will bolster our economy and our national security.

I am immensely proud of what we've been able to achieve on a bipartisan basis. But the vision laid out in *COMPETES* can only be realized if we have a skilled STEM workforce in place to translate research and innovation into products and services.

We need more technicians, manufacturers, software developers, engineers, and scientists to come to the table. We need to foster an inclusive culture to ensure students and workers from all backgrounds can contribute their talents. Let me be clear, our shortage of STEM workers is holding us back. At the very moment when our global competitors and adversaries are pulling ahead on critical technologies, we are struggling to keep pace. It is time we learned a hard lesson from our past mistakes. We cannot race ahead in developing cutting edge technologies without building the workforce critical to ensuring Americans will reap the benefits.

Thank you, again to Chairwoman Stevens for holding this important hearing. I yield back.

Chairwoman STEVENS. Great. And at this time I would like to introduce our witnesses. Our first witness is Ms. Jennifer Mefford. Ms. Mefford is the National Co-Chair of the Electric Vehicle Infrastructure Training Program, EVITP, a volunteer coalition of automakers, utility partners, and EV stakeholders that delivers charging infrastructure, installation training, and certification throughout the United States and Canada. Ms. Mefford has more than 30 years of experience in business and workforce development.

Our next witness is Mr. Ben Cruz. Mr. Cruz is the Director of the Center for Advanced Automotive Technology at Macomb Community College. CAAT is an Advanced Technological Education center funded by the National Science Foundation, something that we care a lot about on the Science Committee, that partners with industry, education, government, and professional organizations to deliver curricula and skills training in advanced automotive technology programs. Prior to joining Macomb Community College, Mr. Cruz was Senior Engineer Group Manager for GM at the Warren Technical Center.

We are also joined here today by Mr. Josh Nassar. Mr. Nassar is the Legislative Director for the United Auto Workers, the UAW. In this role he works closely with Congress, the executive branch, and stakeholders to design a legislative strategy on labor, trade, environment, healthcare, defense, energy, tax policy, and other issues. Mr. Nassar previously worked as an Assistant Legislative Director for the Service Employees International Union. He also worked as the Vice President for Federal Affairs at the Center for

Responsible Lending and served as a Legislative Assistant for Congresswoman Jan Schakowsky.

Lastly, we are also joined by Ms. Marcia Black-Watson. Ms. Black-Watson serves as the Industry Engagement Division Administrator for the Michigan Department of Labor and Economic Opportunity. In this role she leads a team that promotes demand-driven workforce-development strategies to help attract, retain, and develop talent in high-growth, high-wage industry sectors. Marcia has worked in the workforce development field since 1998, spearheading a number of State-level taskforces, projects, initiatives focused on meeting the workforce demands of industry. In January 2021 she received very rightly the State of Michigan Symbol of Excellence Award.

So our witnesses should know that you will each have 5 minutes for your spoken testimony. Your written testimony will certainly be included in the record for the hearing. When you've completed your spoken testimony, we will begin with questions. Each Member will have 5 minutes to question the panel. And if you're all right, Ms. Mefford, we'll start with you for 5 minutes.

**TESTIMONY OF MS. JENNIFER MEFFORD,
NATIONAL CO-CHAIR, ELECTRIC VEHICLE
INFRASTRUCTURE TRAINING PROGRAM (EVITP)**

Ms. MEFFORD. Great, thank you, Chairwoman Stevens and Congresswoman Dingell and distinguished Members of the Subcommittee for inviting me to testify today. My name is Jennifer Mefford, and I currently serve as the National Co-Chair of the Electric Vehicle Infrastructure Training Program, or EVITP. It seems fitting to be here with you in Michigan where EVITP began around the time of the launch of the Chevy Volt. We began as a convening of stakeholders, including automakers, utility companies, charging manufacturers, and safety and electrical professionals, all focused on charging installation best practices and standards and specifically the critical role of the electrician with EV charging service and maintenance.

Getting the charging experience and safety right was critical then and it remains critical today, so we rolled up our sleeves and build EVITP together. Partner advisors volunteer time, expertise, and content to develop a comprehensive brand-agnostic nonprofit training curriculum for licensed electricians or, in States without licensing, electricians with an equivalent of 8,000 hours of on-the-job training.

EVITP training and certification is an 18-hour comprehensive course plus a 2-hour proctored exam. To date, we've certified thousands of qualified electricians in all 50 States and have hundreds of affiliated contractors and are recognized by the U.S. Department of Energy and in the official National Electric Vehicle Infrastructure, NEVI, formula program guidance to States as a highly regarded training program for electricians working on EV charging installations.

EV infrastructure projects are primarily comprised of the electrical construction work skills deployed by experienced electricians every day. Adding advanced EVITP training to an experienced electrician's considerable skills is critical to performing accurate site

assessment, load calculations, adequate sizing, panel upgrades, and much more. It's not a simple dryer outlet.

The majority of EV charging today happens at home. Single-family, multifamily, apartment living, and the addition of new capabilities like bidirectional charging for the Ford F-150 Lightning all present different site access, power requirements, and states of readiness for an experienced electrician to consider, other considerations like panel size and capacity, for example. For example, in Detroit and Cincinnati and many other cities, many homes have 60 to 100 amp service, which is likely not enough to add charging right out of the gate. And while upgrading electrical components and panels does increase the cost of EV charging installations, it's essential for the safety of workers, residents, and first responders. It's really all about safety.

The role of the experienced electrician is critical, especially in areas where electrical inequity may exist due to older infrastructure. Currently, 17 States do not have—do not require electricians to be licensed. The ability to verify experience and expertise through a nationally recognized EV training and certification program, EVITP, will ensure that consumers in all market segments are working with highly skilled, properly trained electricians. Again, it's all about safety.

So how many electricians will it take to get the job done? We're here in Michigan, so I'm going to cite a Michigan example. There are currently 19,637 State-licensed electricians and master electricians in Michigan. More than 450 have advanced EVITP certification skills already. Again, we began 10 years ago, and we've been upskilling workers ever since. Michigan has 6,577 registered apprentices. If Michigan installs 50,000 charging stations over the next 3 years working in crews of varying sizes that include EVITP-certified electricians, non-EVITP electricians, and electrical apprentices, Michigan needs 90 EVITP electricians, 69 non-EVITP electricians, and 118 electrical apprentices to install 50,000 charging stations in 3 years. That's 277 electrical workers out of a total of 26,000-plus or a little over roughly 1 percent.

So the good news is that, for today, we're OK, and that really mirrors out across the country. Frankly, there's been very little infrastructure that's come in, and we've been actively upskilling workforce for a decade. So we're very excited about where we go from here, but of course we have to prepare not for where we are today but for where we're going. We understand that this market is growing rapidly, and we need to be on top of that and in front of it.

So from a workforce perspective, it's a great time to become an electrician. It's a great time to be one and a great time to become one. The entire industry is growing. Electric vehicles, solar, energy storage, smart technologies, grid improvements, and of course manufacturing for all these great facilities to support the industry all offer workforce opportunities for many, including electricians.

The best way to get more qualified electricians is through the U.S. Department of Labor registered apprenticeship programs and quality pre-apprenticeship programs. Registered apprenticeship programs have a proven track record of success in training individuals to succeed in the construction trades for long-term careers

with great wages, benefits, and retirement security. Quality pre-apprentice programs prepare individuals for registered apprenticeships. These programs are crucial for engaging returning citizens, veterans, minorities, and other underrepresented groups that have traditionally been left out of the construction industry and often-times play a critical role in remediating math skills that are so important to be a highly qualified electrician. The industry will also need more qualified electrical contractors. Partnerships with community colleges and universities may offer vital dual track education to prepare more electricians to become contractors.

Charging infrastructure plays a key role in the expansion of the EV market. While the number of licensed and certified electricians in the United States today is adequate for current installations, additional training for existing experience electricians and onboarding of new electricians through registered apprenticeship programs and quality pre-apprentice programs will be key to meet future demand. These need to be dual tracks worked at the same time, but the good news is that we have the infrastructure from a training perspective in place to do that. The EVITP training and certification program ensures a high level of electrical safety and performance in EV charging installation in all markets.

Thank you for the opportunity to address you today. I look forward to questions as we move through the meeting.

[The prepared statement of Ms. Mefford follows:]



**WRITTEN TESTIMONY BEFORE THE
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES**

**MICHIGAN FIELD HEARING ENTITLED
*"Building a Workforce to Navigate the Electric Vehicle Future"***

**JENNIFER MEFFORD
NATIONAL CO-CHAIR
ELECTRIC VEHICLE INFRASTRUCTURE TRAINING PROGRAM (EVITP)**

May 20, 2022

Thank you, Chairwoman Stevens, Ranking Member Feenstra and distinguished members of the Subcommittee for inviting me to testify today on the current EV workforce landscape, the growing demand for licensed and credentialed electricians to support the EV industry adequately and safely, and future workforce development pathways.

My name is Jennifer Mefford and I currently serve as the National Co-chair of the Electric Vehicle Infrastructure Training Program, E-V-I-T-P.

It seems only fitting to be with you in Michigan today, in the very market where EVITP began in 2011 around the time of the launch of the Chevy Volt. EVITP started as a convening of automakers, utility providers, charging station manufacturers, safety professionals, EV industry stakeholders, electrical contractors, and electricians to discuss charging installation best practices and installation standards for the growing EV market and specifically the critical role of the *electrician* in the evolution of electrified mobility.

Getting the charging experience right for customers in Residential, Commercial, Public and Fleet markets was critical then and remains so today. Stakeholders recognized early that customers in the new EV market would have more questions, need more support and would be interacting with an electrician as part of the EV ownership experience – and that electrician would need to understand the electrical construction industry beyond the installation of EV charging equipment, as well as, the rapidly evolving EV industry.



We Rolled Up our Sleeves and Built It...Together.

EVITP industry Partner Advisors volunteered time, expertise, and content to develop a comprehensive, brand-agnostic, non-profit training curriculum specifically for licensed electricians or electricians with an equivalent of 8,000 hours of on-the-job training in markets without licensing. Beyond technical equipment specs for EV charging, the course covers vehicle types, electrical code, site assessment, load calculations, solar and storage integration and much more.

EVITP Training & Certification, delivered through an online LMS platform, is an 18-hour comprehensive course plus a 2-hour proctored exam. To date, EVITP has certified thousands of qualified electricians across all 50 States who work for EVITP affiliated contractors. EVITP is recognized by the U.S. Department of Energy and in the official National Electric Vehicle Infrastructure (NEVI) Formula Program guidance to states as a highly regarded training program for electricians working on EV charging installations.

Not a Simple Dryer Outlet.

Substantial investments in EV infrastructure are a tremendous economic engine creating a growing demand for a highly skilled electrical construction workforce to build out an adequate network of charging stations. While EV charging infrastructure electrical work includes some emerging technology elements, EV infrastructure projects are primarily comprised of the electrical construction work skills deployed by experienced electricians every day – including, for example, performing load calculations, electrical service analysis, and applying National Electrical Code standards.

The majority of EV charging today happens at home, making this the primary charging location for most owners. Single family, multi-family, apartment, and urban dwellings all include different site, access, and power requirements.

Adding advanced EVITP training to an experienced electrician's considerable skills, is critical to performing accurate site assessments, load calculations, ensuring adequate sizing, panel upgrades, EV specific access, security and more in any installation. The addition of bi-directional charging, the "micro-grid on wheels" vehicles coming to market, adds more reasons for electricians to have advanced EVITP training to install EV charging equipment properly and safely.

Throughout the U.S., residential homes not built within the past decade likely have smaller service panels (60-100-amp) where load calculations will be of increased importance. For example, in Detroit and Cincinnati (and many other cities), most homes have 60-100-amp service in the older urban and older suburban neighborhoods. While upgrading electrical components and panels increases the cost of EV charging installations – adding an additional burden to underserved and rural consumers – it is essential for the safety of workers, residents and first responders.



Underserved and rural communities are often already in a position of “electrical inequity” due to older electrical systems in the home and community. The need to upgrade electrical panels increases the cost of EV charging installations adding an additional burden to underserved customers in areas with older infrastructure. Newer construction, often in suburban areas, typically includes panel size with 150-200-amp capacity where a panel upgrade may not be needed.

Currently, 17 States do not require electricians to be licensed. This is an additional consideration for verifying experience and expertise among the existing electrician workforce as we examine workforce readiness for the EV industry.

The ability to verify experience and expertise through a nationally recognized EV training and certification program, (EVITP), which requires a state electrical license or 8,000 hours of electrical field experience as a minimum requirement for program participation, will ensure that consumers in all market segments are working with highly skilled, properly trained electricians.

This is especially critical in underserved communities, where existing “electrical inequity” presents additional challenges and safety concerns -- which makes the risk of using unskilled workers even more dangerous.

How many electricians will it take to get the job done?

We’re in Michigan today, there are currently 19,637* Michigan state certified licensed electricians and Master electricians. They have most of the necessary skills required for EV infrastructure. Electricians are also gaining important additional EV charging infrastructure electrical technology skills through the Electrical Vehicle Infrastructure Training Program (EVITP). More than 450 Michigan electricians** have advanced EVITP certified skills, with hundreds more graduating annually. There are also currently 6,577 registered electrical apprentices in the state.***

Michigan has about 3% of the U.S. population. If the current U.S. goal of 500,000 stations is doubled to 1,000,000, that would be 30,000 stations in Michigan. If we go even further and say Michigan would have a 50,000 station expansion of EV infrastructure, that will put a considerable number of state licensed electricians to work in the following categories and may look something like this:

A) 50,000 Charging Station Installations, of All Types, in Three years.

Residential single family, level 2: Crews consist of one EVITP certified electrician and one apprentice. Each team of two installs, conservatively, eight chargers per week (48 weeks/yr.) or 1,152 in three years. 21 EVITP-led teams of two will install 24,192 units in three years.



Multi-family residential and commercial, level 2: Crews consist of one EVITP certified electrician, one non-EVITP electrician, and one apprentice. Each team of three installs, conservatively, three commercial chargers/week, or 432 in three years. 41 EVITP-led teams of three will install 17,712 units in three years.

Heavy commercial/industrial and DC fast chargers: Crews consist of one EVITP certified electrician, one non-EVITP electrician, and two apprentices. Each team installs, conservatively, two chargers per week, or 288 in three years. 28 EVITP-led teams will install 8,096 units in three years.

In summary, 90 EVITP electricians, 69 non-EVITP electricians, and 118 electrical apprentices would install 50,000 charging stations in three years. That's 277 electrical workers, out of a total of 26,214 or 1.06% of the existing electrical workforce.

B) If we double that 50,000 stations to 100,000 in Michigan, we would need 2.12% of the existing workforce, including 180 EVITP Certified electricians.

**Source: Michigan LARA Office as of October 20, 2021*

***Source: Electrical Vehicle Infrastructure Training Program as of October 20, 2021*

****Source: Michigan Department of Apprenticeship Standards as of October 20, 2021*

Workforce Development: It's a great time to become an Electrician.

EV Market growth and the expansion of the solar and energy storage markets will require more licensed and certified electricians. The best way to get more qualified electricians into the field is through U.S. Department of Labor Registered Apprenticeship Programs and quality pre-apprenticeship programs that prepare and place individuals in Registered Apprenticeship Programs. Registered Apprenticeship Programs have a long history and proven track record of success in training individuals to succeed in the construction trades for long-term careers with great wages, benefits and retirement security.

Apprenticeship Readiness Programs – Pathways to Construction Careers

Quality Pre-Apprenticeship and other Apprenticeship-Readiness Programs: Pre-apprenticeship and other apprenticeship-readiness programs may combine classroom education with on-the-job (OTJ) paid work experiences to prepare individuals for success in Registered Apprenticeship programs. These programs are crucial for engaging returning citizens, veterans, minorities and other underrepresented groups that have traditionally been left out of the construction industry. Pre-apprentices get to learn about the trade and access important support services like math and reading remediation.

In 2021, EVITP was asked to partner on the Bloomberg Philanthropy American Cities Climate Challenge in 26 select U.S. markets to award Scholarships for EVITP training to qualified electricians. 50% of the electricians selected for this program were women, black, indigenous



people or people of color. EVITP strongly supports and engages an EV workforce of qualified electricians that is equitable and inclusive.

In addition to the need for more electricians, the industry will also need more qualified electrical contractors. Partnerships between DOL Electrical Apprenticeships, Community Colleges and Universities may offer vital dual track education to prepare more electricians to become business owners and entrepreneurs to serve the EV industry and the growing electrical industry.

In Summary:

Charging infrastructure plays a key role in the expansion of the EV market. While the number of licensed and certified electricians in the U.S. today is adequate for current installation needs in most areas, additional training for existing electricians and onboarding of new electricians through Registered Apprenticeship Programs and quality pre-apprenticeship programs will be key to meeting future demand. The EVITP Training and Certification program ensures a high level of electrical safety and performance in EVSE installation in all markets.

Thank you for the opportunity to address you this morning on this important topic. I invite any questions you may have around EVITP or electrician workforce readiness.



Jennifer Mefford
MTD Consulting Group
EVITP National Co-Chair

Business Development – Workforce Development
Communications – Market Expansion

Biography

Jennifer Mefford has 30+ years of business and workforce development, marketing, and management expertise with large, small, and mid-sized companies.

As Founder and CEO of MTD Consulting Group, her firm consults exclusively with construction associations, labor organizations, apprenticeship programs and construction related business and workforce development programs.

For the past decade, Jennifer has served as National Co-Chair of the Electric Vehicle Infrastructure Training Program (EVITP), a volunteer coalition of automakers, utility partners, EVSE manufacturers and EV stakeholders that delivers charging infrastructure installation training and certification throughout the U.S. and Canada for residential, commercial, public and fleet markets. www.EVITP.org.

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Ms. Mefford may be reached at: 248-318-7885 or JMEVITP@gmail.com

Chairwoman STEVENS. We're one witness in, and we can already tell we would like to be here all day, given how exciting and important this topic is.

But with that, we're going to move to Mr. Cruz for 5 minutes of opening statement. Thank you.

**TESTIMONY OF MR. BENIGNO "BEN" CRUZ,
DIRECTOR, CENTER FOR ADVANCED
AUTOMOTIVE TECHNOLOGY (CAAT),
MACOMB COMMUNITY COLLEGE**

Mr. CRUZ. Thank you. Representative Stevens and distinguished Members of the Committee, thank you for inviting me to join this meeting—this hearing here today. My name is Ben Cruz, and I'm Director for the Center of Advanced Automotive Technology at Macomb Community College. And I am honored to join the Committee to talk about building a workforce to support the future of electric vehicles.

From my perspective and my role at Macomb Community College, CAAT, CAAT is the Center for Advanced Automotive Technology. I'm going to refer to it as CAAT from here on. I believe that Detroit has taken a new leadership role in EV engineering and EV manufacturing. Recent news from OEMs including GM, Ford, Chrysler, Nissan, Toyota, as well as other companies, document that they are fast-forward in investments in advanced EV technology, EV manufacturing, EV development, EV design, and anything that has to do with the EV industry.

Equally significant is the number of tier 1 EV slot system and component suppliers. These are the companies that supply, you know, to the OEMs. They have a strong presence here in Detroit and the Detroit area. While this is good for southeast Michigan, our region is not alone in working to attract electric vehicle manufacturing and related industries. Several States are putting together great—a great deal of effort in becoming significant players in the EV industry ecosystem.

Fostering and maintaining robust skilled—a robust, skilled workforce will be a key component to attracting and retaining these industry members. Currently, we have a shortage in locally—here locally, and EV—in the EV technically skilled workers in the area of vehicle development, vehicle design, vehicle test, the research and development (R&D) activity. In—that needs attention. Representatives from several of our companies I've named have come to Macomb—to Macomb Community College to look for potential employees. In most cases, they are also looking for training programs to upskill their current and incoming workers.

Developing courses and training programs in emerging technologies requires input from industry experts. CAAT works hard to keep current with training automotive advancements by developing and cultivating partnerships with industry. We work collaboratively with industry—working collaboratively with industry is the foundation from which development—the development of courses and programs come from, and this is for degree programs and non-credited workforce training. The—this ensures providing our students with the most relevant training to support them in

gaining higher technical skill sets that are needed to work in the area companies involved in the electric vehicle industry.

Macomb Community College offers associate degree programs in automotive technology, engineering technology, including an associate degree like the vehicle engineering technician program, the automotive manufacturing technician program. Additionally, Macomb Community College—Macomb CAAT also has several courses in EV power electronics—electrical drive systems, and as well as several industry-related workforce development programs. Macomb vehicle—the—Macomb’s vehicle engineering technician program was developed with input from Continental, Bosch, GM, and it’s a unique program that blends aspects of automotive systems, mechanical systems, electronics, instrumentation, software skills, you know, in preparing these students with an expertise to be able to work in engineering laboratories, engineering test proving grounds, and other development facilities of the OEMs.

Macomb CAAT also works to connect students to the next level of education and automotive mobility-related programs. Building on their initial education at Macomb, students can pursue a bachelor’s degree in automotive EV engineering technology or a bachelor’s of science degree in engineering through our partners at Wayne State University, a local university here in Detroit.

We also recognize the importance of introducing to the youth the possibilities and opportunities of career and emerging automotive technologies. We have STEM outreach programs that span through 5th through 12th grade with hands-on building projects that demonstrate the performance of wind power, electrical solar cells, battery electric-powered cars, embedded programming, autonomous vehicle systems, and then with a 7th grade—7th and 8th grade students we work with electrified and automated smart robot cars, engaging the students in constructing and programming the micro-controllers and then showcasing the autonomous vehicle performance. Additionally, for high school students here at Macomb and CAAT support First Robotics. We teach teams fabrication skills, and we teach teams embedded microcontroller programming. You know, this is something that’s going to be used in the autonomous vehicle area.

In conclusion, there is still a much—much work that needs to be done, significant efficacy placed in training the new workforce, upskilling incumbent workers, training underrepresented populations, and conducting effective outreach K through 12 to engage and expand youth interest in skilled trades, technology, and emerging fields. Thank you.

[The prepared statement of Mr. Cruz follows:]

Written Testimony of
Benigno (Ben) Cruz
Director, Center for Advanced Automotive Technology (CAAT)
Macomb Community College

Before the House Committee on Science, Space, and Technology
For the hearing titled
Building a Workforce to Navigate the Electric Vehicle Future
May 20, 2022

Representative Stevens and distinguished members of the committee, thank you for the invitation to join the hearing today. My name is Ben Cruz, and I am the director of the NSF Center for Advanced Automotive Technology (CAAT) at Macomb Community College in Warren, Michigan. I am honored to join the committee to talk about building a workforce to support the future of electrical vehicles.

From my perspective in my role at Macomb's CAAT, I believe that Detroit is taking a new leadership role in EV engineering and EV manufacturing. Recent news from the OEMs including Ford, GM, Chrysler, Nissan and Toyota, as well as companies such as Rivian, Lucid Motors, Spartan Motors and Bollinger Motors document that they are fast-forwarding investment in EV advanced vehicle technology, vehicle development and EV-related manufacturing

Equally significant is the number of Tier One EV system and component suppliers to the OEMs that have a strong presence in metro Detroit. Companies like MAGNA, BorgWarner, Jabil, Bosch, American Axle, Contemporary Amperex Technologies, Continental, Roush Industries, among others, have local

engineering centers and manufacturing facilities. While this is good for the Southeast Michigan, our region is not alone in working to attract electric vehicle and related industries. Several states are putting a great deal of effort into becoming significant players in the EV industry ecosystem.

Fostering and maintaining a robust skilled workforce will be a key component to attracting and retaining these industry members. Currently, we have a shortage locally in EV technical skilled workers that needs attention. Representatives from several of the companies I've named have come to Macomb Community College to look for potential employees. In most cases, they are also looking for training programs to upskill their incumbent workers.

Developing courses and training programs in emerging technologies requires input from industry experts. CAAT at Macomb Community College works hard to keep current with trending automotive advancements, developing and cultivating partnerships with industry. Working collaboratively with industry is the foundation from which we develop courses and programs, whether they are degree programs or non-credit workforce training. This ensures we are providing our students with the most relevant training to support them in gaining the higher technical skills sets needed to work at area companies involved in the electric vehicle industry.

Macomb Community College offers associate degrees in automotive technology, engineering technology -- including a vehicle engineering technician associate degree -- and automotive manufacturing. Additionally, Macomb/CAAT also has several courses on EV power electronics and electrical drive systems, as well as several industry-related workforce development programs.

Macomb's Vehicle Engineering Technician program was developed with input from Continental, Bosch, and GM. The unique program blends aspects of automotive systems, mechanical, electronic, instrumentation and software skills. It prepares students with the expertise necessary to work in an engineering laboratory and in test development departments. Those who complete this program have the technical skills required to assist engineers in the development of electro-mechanical systems for the next generation of safe, efficient, electrified and intelligent vehicles.

Macomb's Automotive Manufacturing program was developed with input from FCA (now Stellantis), providing the opportunity to develop automotive manufacturing, manufacturing automation and leadership skills while earning an associate degree. The students participate in a paid co-op program, working at least one day per week at a Stellantis manufacturing facility while attending classes at Macomb the remainder of the week. Candidates are recruited for the program by both Macomb/CAAT and Stellantis, primarily through information sessions.

Macomb/CAAT also works to connect students to the next level of education in automotive mobility-related programs. Building on their initial education at Macomb, students can pursue a bachelor's degree in automotive and EV engineering technology or a bachelor of science degree in engineering through Wayne State University, located nearby in Detroit.

We also recognize the importance of introducing to youth the possibilities and opportunities of careers in emerging automotive technologies. We have STEM outreach programs that span the fifth through twelfth grades, with hands-on building projects and demonstrations of the performance of wind-power, electric solar cells, battery electric power cars, embedded programming and autonomous vehicles. With seventh- and eighth-grade students, we work with electrified and automated smart robot cars, engaging the students in constructing and programming the car's microcontrollers, and then showcasing the vehicle's autonomous performance. Additionally, for high school age students, Macomb/CAAT supports First Robotics, teaching teams fabrication skills and embedded microcontroller programming.

In conclusion, there is still much work to be done. Significant effort must be placed in training the new workforce, upskilling incumbent workers, training underrepresented populations and conducting effective outreach to students in K-12 to engage and expand youth's interest in the skilled trades, technology and the engineering fields.



Benigno (Ben) Cruz
Director, Center for Advanced Automotive Technology
Macomb Community College

Ben Cruz is director of Macomb Community College's Center for Advanced Automotive Technology (CAAT). Funded by the National Science Foundation, Macomb's CAAT is an advanced technological education center that partners with industry, education, government and professional organizations to identify opportunities for the creation and adaptation of curricula in advanced automotive technology programs, helping students prepare for careers in new and developing technologies.

Prior to joining Macomb Community College in 2019, Cruz was senior engineering group manager for General Motors at the Warren Technical Center, managing the Climatic Wind Tunnels and HVAC System Test Simulation Laboratory. In his more than 40-year career with GM, he held several other roles in engineering, including managing the startup of a vehicle test group in Mexico, and leading the test and development engineers at the company's Desert Proving Ground in Mesa, Arizona

Cruz earned a bachelor of science in engineering from Arizona State University and a master's in business administration (international industrial management) from the University of Phoenix.

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Chairwoman STEVENS. Phenomenal. And with that, we'll hear from Mr. Nassar for 5 minutes of testimony.

**TESTIMONY OF MR. JOSH NASSAR,
LEGISLATIVE DIRECTOR, UNITED AUTO WORKERS (UAW)**

Mr. NASSAR. Thank you, Chairwoman Stevens and Members of the Subcommittee and guests. I'm really honored to be here today on behalf of not just the 1 million members of UAW and retirees but also our President Ray Curry and the Executive Board.

It's really fair to say that the majority of UAW's members and retirees' livelihood and retirement security depends on the success of the U.S. auto industry. There's an awful lot at stake here for UAW members and retirees, but also it's much broader than that because it's also we're talking about the communities where folks live in and the fact that, you know, auto manufacturing has always been the cornerstone of domestic manufacturing in the United States. And as this transition happens, we need to keep it that way.

But the reality is that U.S. autoworkers are facing a lot of difficulties and headwinds. When you adjust for inflation over the past 15 or so years, you see that wages have not kept up with productivity and cost of living at all for autoworkers. In fact, it's dropped by about 20 percent, again, when adjusted for inflation. Why is that happening? Well, it's happening for a plethora of reasons. You know, bad policies frankly, tax laws that reward offshoring, trade policies that are for corporations' interests rather than workers', weak labor law, lack of worker centric procurement. But overwhelmingly, we've lacked an industrial policy.

I think it's really important to point out that China, for example, they have made at least \$60 billion worth of support to foster their EV industry, which is far ahead of ours. And they're also dominating the supply chain. And some people tend to—you know, will assume that they dominate the supply chain for electric batteries because of some kind of geographic advantage, but that's really not true. The vast majority of the minerals, they are not located in China. It's just they've been very proactive and they've had a policy of trying to secure domination in EVs, we haven't done that.

And it's happening. The EV transition is happening. While it's still a small percent of the overall auto market, there's no question it's going to grow. So the question is not whether more EVs are going to be on the road or built but where are they going to be built and what kind of jobs are they going to support? So it's really going to be important that the Federal Government use all levers of power to ensure that taxpayer money to support this industry is used in support of creating and maintaining good union jobs. That's absolutely critical.

We have seen—you know, there's quite a few startups in this industry. We don't know a lot of times kind of how they're going to interact with the workforce, but we have seen troubling things from many foreign-based auto companies who are unionized in their home countries and then they come to the United States, they take a very hostile view toward unions. There are companies that have their only nonunion facilities in the U.S.

So clearly we have a lot to do as far as labor law, as far as creating incentives to reward the creation of good union jobs. That's one of the reasons why we're so happy with the House-passed *Build Back Better* and the Kildee-Stabenow EV tax credit that actually encourages and rewards the creation of good union jobs and also encourages cars to be made domestically. We think that's really important, and we hope the Senate, you know, will pursue those policies.

But the real bottom line here is that this—we cannot leave workers behind. This cannot be a process where workers are an afterthought, where we just leave it up to the—you know, the decisions made in corporate board rooms to—and Wall Street to decide where this industry is going to be built and where these jobs are going to be made. And we need to secure the entire supply chain from the gathering, you know, of minerals to the production of the batteries, not just the battery packs but the—all the way through.

As far as job training and getting folks ready, we absolutely need to have a focus on that. I will point out that UAW has successfully worked with many of our employers through our collective bargaining to have really effective apprenticeship programs. I think that's something that I've encouraged the Congress and this Committee to look at where people get—basically are skilled to the new technologies.

There's constant evolution in the auto industry. Autoworkers are prepared to make the vehicles of the future. They're doing it already. But this transition is not going to be as successful, it's not going to be as good for workers as it needs to be unless Congress is very proactive here and unless we have very deliberate policies. And again, we can't just go with the idea that, you know, whatever corporations decide to do or invest in, that's going to solve it all because that won't end well for working people and for our communities.

So thank you for the opportunity to testify. I really look forward to answering questions. Again, it's an honor to be here today. Thank you.

[The prepared statement of Mr. Nassar follows:]

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INTERNATIONAL UNION, UNITED AUTOMOBILE, AEROSPACE & AGRICULTURAL IMPLEMENT WORKERS OF AMERICA – UAW

RAY CURRY, *PRESIDENT*

FRANK STUGLIN, *SECRETARY-TREASURER*

VICE-PRESIDENTS: CHUCK BROWNING • TERRY DITTES • CINDY ESTRADA

May 20, 2022

**Building a Workforce to Navigate the Electric Vehicle Future for House Research and Technology
Subcommittee Submitted by Josh Nassar
UAW Legislative Director
1757 N Street NW, Washington, D.C. 20036**

Chairwoman Stevens, Ranking Member Feenstra, and members of the Subcommittee, on behalf of the over one million active and retired members of the International Union, United Automobile, Aerospace, and Agricultural Implement Workers of America (UAW), UAW President Ray Curry, and the UAW International Executive Board (IEB), I want to thank you for the opportunity to share our perspective on workforce issues pertaining to electric vehicle manufacturing. It is my honor to appear before you today.

Importance of the U.S. Motor Vehicle Industry

The United States' motor vehicle industry is advanced, competitive, and the cornerstone of American manufacturing. The domestic vehicle assembly and parts industries are vital to our manufacturing base, and it is imperative that we stay strong and competitive now and into the future.

The majority of our members and retirees work in or have retired from the auto industry. They are directly impacted by decisions made in Washington, D.C., and corporate boardrooms. Investments in motor vehicle manufacturing jobs impact workers, their families, and communities. Over 900,000 people work in the auto and auto parts manufacturing sectors.¹ The economic impact of the auto industry reaches far beyond workers employed at the plants and their families. According to the Center for Automotive Research, the auto industry is responsible for over 7.25 million jobs nationwide when jobs from other linked industries are considered.² The long-term health of the industry is critically important to both workers and the economy at large.

Auto manufacturing is not regional and extends well beyond the upper Midwest. For example, in the past year, significant investments in motor vehicle and battery manufacturing have been announced in Tennessee, Georgia, Michigan, North Carolina, and Kentucky. The auto industry's supply chain extends far and wide throughout the country.

¹ Bureau of Labor Statistics, "Automotive Industry: Employment, Earnings, and Hours", <https://www.bls.gov/iag/tgs/iagauto.htm>

² Hill, Kim, Deb Menk, Joshua Cregger, and Michael Schultz. "Contribution of the Automotive Industry to the Economies of All Fifty States and the United States." Center for Automotive Research. January 2015.

Headwinds Facing Workers and Auto Sector

U.S. auto workers face serious headwinds stemming from many quarters, including weak labor laws that fail to protect workers' rights to join a union, bad trade deals that put the interests of investors before workers, and misguided tax incentives that permit corporations to pay fewer U.S. taxes on profits earned overseas than those earned within our borders and allow some corporations to pay no corporate taxes at all. Over the past several years, U.S. automotive production workers' wages have fallen significantly. When adjusting for inflation between January 2006 and January 2021, average hourly earnings for production workers in auto assembly declined by 21% while wages in the auto parts sector have decreased by 19%.³

Decades of trade and tax policies have put the interests of corporations and Wall Street executives before workers, adding to the impediments workers face. Corporate-driven trade agreements that pit workers against one another have also played a significant role in eroding wages and working conditions. For decades, workers often face both direct and implied threats if they attempt to form a union. On countless occasions, employers have threatened to close their plant and move to Mexico when workers fight for job security, better wages, health and safety improvements, and retirement security. Veiled threats hurt workers at the bargaining table as companies often coerce workers into accepting lower wages for fear that the company will ship their jobs abroad.

These challenges need to be addressed, especially during this time of change as the motor vehicle industry transitions from fossil fuel to electricity. For this transition to benefit auto workers, the entire supply chain, from the gathering of minerals needed to power batteries to the manufacturing of the battery and other parts to final assembly, must support the creation and preservation of good union jobs. Of course, it is far from certain that growth in EV sales will lead to more good union jobs.

We are witnessing production launches by several start-ups with many more to come. If new entrants are hostile to unions and provide subpar wages and benefits, it will further erode job quality in the industry. This is not a theoretical concern as foreign-based automakers typically resist efforts to unionize in the United States. This strong opposition exists even though every foreign-based light duty Original Equipment Manufacturer (OEM) is unionized in its own country. A report by Professor Gordon Lafer details the array of tactics foreign-based automakers have utilized to prevent unionization.⁴ Professor Lafer's research serves as a strong reminder as to why we need labor law reform as Congress has not strengthened our nation's labor laws in over 85 years.

In the auto industry, Toyota, Nissan, Hyundai, Mercedes-Benz, BMW, Volkswagen, and Honda have all hired "union avoidance" specialists to guide their anti-union campaigns in the United States. Nissan's anti-union campaign led the National Labor Relations Board (NLRB) to issue a formal complaint charging the company with twenty-four counts of lawbreaking. The fact Nissan engaged in such tactics so soon after having been forced to post public notices vowing to respect the law is a testament to the near total

³ Bureau of Labor Statistics. "Average hourly earnings of production and supervisory employees." Series CEU3133610008 & CEU3133630008, Data from January 2006-January 2021. Adjusted using BLS CPI Inflation Calculator.

⁴ Lafer, Gordon. Labor Education and Research Center. "Building Back Better or building back worse?" Online at [BuildingBackReport.pdf](https://www.laborer.org/BuildingBackReport.pdf) (cpb-us-e1.wpmucdn.com).

absence of meaningful penalties under current law. All of Nissan's plants in other countries are unionized.⁵ The experience of autoworkers seeking to have a voice on the job highlights the need to strengthen and modernize our anemic labor laws. In fact, Congress has not strengthened the National Labor Relations Act (NLRA) since its passage in 1935. Fortunately, the House took a key step last year by passing the Protect the Right to Organize (PRO) Act. The PRO Act strengthens penalties against employers that violate workers' rights, prohibits captive audience meetings, provides for mediation on first contracts, supports a worker's right to strike for basic workplace improvements, and repeals so-called "right-to-work" laws. The passage of the PRO Act would go a long way in ensuring that our existing workforce is protected by strong labor laws which allow them to bargain for fair wages, access to health care, health and safety protections in the workplace, and dignified retirement. The PRO Act is also beneficial for workers seeking to organize a union, affording them critical protections and benefits they deserve as we make this EV transition. It is unclear at this moment in time if these workers will rightfully join the ranks of our existing members or if they will have to fight for a union. We know all too well the intense anti-union antics that workers face when they try to form a union. The recent Amazon and Starbucks campaigns are a good case in point. Corporations like Amazon spends millions of dollars to hire anti-union consultants to interrogate and intimidate workers when they seek union representation.⁶ It has become all too common for employers to threaten relocation or shutting down operations if workers seek to form a union. We urge the Senate to follow the House's lead by passing the PRO Act so it can be signed into law by President Biden.

It is also reasonable to tie strong labor standards to EV tax credits to incentivize consumers to purchase union-made, American-made electric vehicles as exemplified by the Kildee-Stabenow EV tax credit in the House-passed Build Back Better Act.

Misguided tax laws also present a formidable challenge to workers. For example, a company with \$100 million worth of tangible offshore assets pays no U.S. taxes on the first \$10 million of foreign profits they report. A lengthy list of companies end up paying no U.S. taxes on foreign earned profits. Provisions in our tax laws create perverse incentives for U.S. corporations to move real investments offshore, along with the manufacturing jobs that go with them. These incentives will become greater over time if they remain in place.

Procurement decisions that ignore the impact on workers is another problem that we cannot afford to ignore. Case in point, in February 2022, Oshkosh Defense was awarded a contract to design and build the next-generation vehicles for the United States Postal Service (USPS). Oshkosh Defense is a defense contractor that manufactures products for the U.S. military in its unionized plants in Oshkosh, Wisconsin. Oshkosh workers have been UAW members since 1938. Despite these facts, Oshkosh, upon winning the contract, announced they are planning to take the \$6 billion contract to a new, non-union plant in South Carolina instead of having UAW members in Wisconsin carry out this lucrative contract by building the next-generation vehicles in Wisconsin. It is far from clear that USPS gave any meaningful consideration

⁵ Lafer, Gordon. Labor Education and Research Center. "Building Back Better or building back worse?" Online at [BuildingBackReport.pdf \(cpb-us-e1.wpmucdn.com\)](#).

to the impact on workers and communities when awarding this significant contract. Our procurement policies need to hold employers accountable and support working families.

Supply Chain Resiliency

Lack of supply chain resiliency is yet another headwind facing autoworkers, their families, and the communities they live and work in. The ongoing pandemic continues to negatively impact the motor vehicle industry regarding both production and demand as there are still over 95,000 cases per day. As we are all painfully aware, the global coronavirus pandemic is by no means over and will take years until we fully appreciate the profound impact it has had on our country and the world.

When it comes to the motor vehicle sector, the lack of resiliency in our global supply chains has demonstrated that the slightest disruption can have significant impacts on working people and the economy. Our members have been severely impacted by the pandemic-driven shortage of automotive-grade semiconductors. Production at numerous U.S. plants has been idled and tens of thousands of workers have been laid off, with ripple effects across the automotive value chain.

The current shortage is relevant to this hearing. EVs and AVs are heavily reliant on semiconductors. An EV autonomous vehicle will have over a thousand dollars' worth of semiconductors. The average EV has double the number of chips of an ICE powered vehicle.⁷ This increase in semiconductor usage comes at a time when U.S. semiconductor manufacturing has been in decline. The total number of U.S. fabrication plants has decreased from 123 in 2007 to 95,⁸ while the industry employs 100,000 fewer production workers than it did at the turn of the century.⁹ Currently, U.S. manufacturers account for only 13% of the global semiconductor supply. This is because the U.S. is no longer attracting new fabs. In 2011, of the twenty-seven high-volume fabs built worldwide, only one was in the U.S. while eighteen were in China and four in Taiwan. In 2018, 20 new fab projects were announced in China, with total investments exceeding \$10 billion.¹⁰

We commend the House for passing the America Creating Opportunities, Pre-Eminence in Technology, and Economic Strength Act (COMPETES). Both the COMPETES Act and Senate-passed U.S. Innovation and Competition Act (USICA) would provide more than \$52 billion to address the semiconductor shortage that is crucial for auto manufacturing and a host of other sectors. Secure access to domestically produced semiconductors is particularly critical for advanced technology vehicles that require even more semiconductors than traditional vehicles. We encourage conferees to ensure that the funding level is not reduced and that auto jobs building cleaner vehicles must pay family and community-sustaining wages as well as provide benefits that workers can count on to care for themselves and their loved ones.

⁷ Scientific American. November 30, 2021. "Chip Shortage Threatens Biden's Electric Vehicle Plans, Commerce Secretary Says": <https://www.scientificamerican.com/article/chip-shortage-threatens-bidens-electric-vehicle-plans-commerce-secretary-says/>; IDTechEx, September 23, 2021. "EV Power Electronics: Driving Semiconductor Demand in a Chip Shortage": <https://www.idtechex.com/en/research-article/ev-power-electronics-driving-semiconductor-demand-in-a-chip-shortage/24820>

⁸ MForeSight, "Manufacturing Prosperity: A Bold Strategy for National Wealth and Security", June 2018: <http://mforesight.org/download/7817/>

⁹ BLS, Quarterly Census of Employment and Wages (QCEW) for NAICS 334413, <http://www.bls.gov/cew/>.

¹⁰ MForeSight, "Manufacturing Prosperity: A Bold Strategy for National Wealth and Security", June 2018: <http://mforesight.org/download/7817/>

Need to Create and Maintain Good Jobs

To meet the ambitious EV targets put forward by major automakers and elected officials, we will need to invest in workforce capabilities. Luckily, the U.S. economy is not starting from nothing thanks to the large pool of American workers who not only assemble vehicles but build a wide range of materials and components for those vehicles. The UAW has around 200,000 members in auto-related manufacturing throughout the country from Michigan to Texas. These workers have a high baseline knowledge of manufacturing and a familiarity with manufacturing training programs. As we see a growth in battery pack, cell, and component manufacturing, material processing, or recycling, UAW workers are well positioned to transition into these new types of manufacturing. With investment in key EV & battery-specific training programs for the current workforce, these workers can hit the ground running, building the vehicles of the future, and require less investment than starting with a whole new workforce.

The UAW has a long history of supporting investments to train American manufacturing workers with labor input. For example, the UAW has a Skilled Trades Department with a long and successful history of building a strong pipeline of skilled workers critical for auto companies to grow their business and compete in a global economy. And through collective bargaining, the UAW has pushed the industry to continually invest in skilled trades and production workers, whether through work-based training, apprenticeships, or tuition assistance for skill development. With new vehicle and manufacturing technologies, the union is exploring all avenues for productive partnerships with employers, government, and educational institutions to promote upskilling and reskilling related to batteries, motors, material processing, recycling, fuel cell technology, and electric vehicle assembly.

If there is one thing that is a “constant” in the auto industry, it is that it is constantly evolving and changing. Jobs that were once done by hand are now done by robots and machines. UAW joint training programs work hand in hand with local training coordinators to determine what additional education and training is needed for journeymen and apprentices when innovative technologies emerge, such as EVs. Training programs also need to coordinate with local community colleges to modify curriculum and classes to prepare the workforce for such changes.

As changes occur, we also need to simultaneously provide comprehensive re-training programs to prepare displaced workers for this shift to new technologies. Federal and state governments must invest in improving and expanding vocational training and apprenticeship programs, with an active role for unions to ensure quality training and high road working conditions. These programs must provide workers not only with the skills to make EV vehicles and components, but also prepare them for the changing nature of manufacturing work as automation and other new technologies change the production process. Congress should also incentivize the development of joint training and apprenticeship programs between employers and unions and push employers to commit to retraining workers displaced by new technology.

In addition to investing in American autoworkers, we must ensure that the investments to build vehicles and components are made in the communities where autoworkers are currently building traditional gas-powered vehicles and powertrains. We cannot wait for ICE jobs to be lost as we need to target new

investments for auto manufacturing communities now. Auto manufacturing is central to the economy of many communities, creating community-sustaining manufacturing jobs and stimulating economic activity in other sectors. Government support for EV investments should prioritize investments that create jobs in communities currently producing ICE vehicles and powertrains, hire incumbent autoworkers, and provide wages and benefits on par with unionized auto industry standards.

Union workers must lead this transition. In fact, UAW members are currently building the vehicles of the future. Our members currently make advanced technology vehicles that include battery electric (Chevy Bolt, GMC Hummer, Ford F-150 Lightning, Ford E-Transit), plug-in hybrids (Jeep Wrangler PHEV, Jeep Grand Cherokee PHEV, Ford Escape PHEV, Lincoln Corsair PHEV), and autonomous vehicles (GM's Cruise Autonomous Vehicle). UAW employers have announced plans to make EVs and PHEVs at UAW plants in a range of segments, including CUVs, SUVs, pickups, and delivery vans.

EV Sales and Investments

EV sales have grown steadily over the past decade, but they still represent a fairly small percentage of vehicle sales. EVs and PHEVs (Plug-in Hybrids) combined to represent 4% of U.S. auto sales in 2021¹¹ and EVs face several hurdles to mass-adoption. EVs are more expensive to produce, making them less profitable and dependent on consumer incentives. In most parts of the country, EV charging infrastructure is woefully inadequate, and the electrical grid is unprepared. Consumers shopping for an EV have been known to have concerns about battery range and charging speed as they have a limited selection of models and segments.

To be clear, this transition will take time and will occur at different rates throughout our country and world. However, there is little doubt that the transition will happen. The Administration's goal is to have at least 50% of new vehicles be EVs or PHEVs by 2030. They announced nearly \$5 billion will be made available to build out an electric vehicle charging network over the next 5 years and \$3 billion to advance the domestic EV industry in communities that have historically been part of the auto industry.

The global market is moving towards even more efficient vehicles, including hybrid and electric vehicles. Global electric car registrations increased by 41% in 2020, despite the pandemic-related worldwide downturn in car sales, in which global car sales dropped 6%.¹² It has been projected that by 2040, over 50% of new car sales globally will be electric.¹³ The industry is preparing for EVs to be a much larger part of the market going forward, both in the U.S. and abroad. Major automakers around the world have announced billion-dollar EV investments and ambitious new product plans and target dates.

As automakers improve technology, decrease battery costs, and produce at scale, EVs will become increasingly more competitive with ICEs (Internal Combustion Engine). And in the coming years, automakers plan to launch EVs in the segments that are most popular with American consumers: CUVs, SUVs, and pickups. Electrification is not limited to the light-duty auto industry. Companies that produce

¹¹ Wards Intelligence. Jan 2022. "U.S. Light Vehicle Sales, December 2021":

<https://wardsintelligence.informa.com/W/966151/US-Light-Vehicle-Sales-December-2021>

¹² International Energy Agency, "Global EV Outlook 2021." <https://www.iea.org/reports/global-ev-outlook-2021>

¹³ BloombergNEF, "Electric Vehicle Outlook 2020." <https://about.bnef.com/electric-vehicle-outlook/>

heavy-duty trucks and off-highway vehicles are also investing in future technology for electrification and autonomy.

The U.S. is far behind other nations in public and private investments needed to make the U.S. a competitive player in vehicle electrification. China has invested more than \$60 billion to support EV manufacturing. Chinese firms, either owned or supported by the Chinese government, currently produce 60% of passenger EVs sold around the globe and produce almost 70% of battery cells.¹⁴ China also controls some 80% of the supply of rare earth minerals, which are essential for aerospace, defense, and EV production, and may impose export controls on these vital materials.¹⁵ The European Union (EU) has established the European Battery Alliance to promote production of batteries and key components within the EU.¹⁶ South Korea is home to LG Chem, the world's largest producer of lithium-ion batteries for electric vehicles, with a 24.6% market share. The company has plans to triple its battery production.¹⁷

If the U.S. fails to make public investments and adopt smart public policies to encourage and attract investment in the growing electric vehicle market, companies will relocate production and supply facilities in countries that are making these investments. The greener vehicles of the future are going to be built somewhere and other countries are preparing for these innovative technologies. We could see the U.S. auto industry fall behind on advanced technology, hurting the American economy and American workers. Ignoring these realities is not an option because it cedes the future to other nations that have a significant auto manufacturing footprint.

Investing in American Autoworkers

We are at a pivotal juncture as automakers are transitioning many of their fleets from gas and diesel-powered vehicles to electric ones. The shift to EVs cannot come at the expense of good wages and benefits and it is critical that we do not leave workers behind as the industry transitions to electrification.

The EV transition reinforces the continued importance of putting in place policies that facilitate vehicle and parts production in the United States and ease impediments to workers at non-union automakers to organize. As the nation invests in a transition to innovative technology, we must seize upon these opportunities to preserve and increase quality jobs. We have an opportunity, right now, to ensure that future EV investments incentivize production of EVs in the United States, made by union workers. Unionized workers earn on average 10.2% more than their non-union counterparts.¹⁸ Union workers are more likely to have paid sick days and health insurance compared to non-union workers. Ninety-four percent of union workers participate in a retirement plan compared with 67% of non-union

¹⁴ The New York Times, "The U.S. Auto Industry Bets Its Future on Batteries," February 16, 2021. [The Auto Industry Bets Its Future on Batteries - The New York Times \(nytimes.com\)](https://www.nytimes.com/2021/02/16/business/autos-industry-bets-future-on-batteries.html)

¹⁵ Financial Times, China targets rare earth export curbs to hobble U.S. defence industry, February 16, 2021. Available Online: [China targets rare earth export curbs to hobble US defence industry | Financial Times \(ft.com\)](https://www.ft.com/content/2021-02-16/china-targets-rare-earth-export-curbs-to-hobble-us-defence-industry)

¹⁶ European Battery Alliance, "EBA 250," accessed Jan. 15, 2020. Available online: www.eba250.com/about-EBA250?cn-reloaded=1

¹⁷ Reuters, "LG Chem to Triple its EV Battery Production Capacity," October 21, 2020. Available online: [LG Chem to triple its EV battery production capacity \(autoblog.com\)](https://www.autoblog.com/news/2020/10/21/lg-chem-to-triple-its-ev-battery-production-capacity/)

¹⁸ Economic Policy Institute. Unions Help Reduce Disparities and Strengthen Our Democracy, April 2021.

workers. Policies that strengthen labor standards and support workers' right to collectively bargain are foundational to building a strong middle class.

Our country needs a coordinated industrial policy centered on maintaining and growing high-quality jobs in U.S. manufacturing while combating climate change and advancing equity. As we work toward the future of clean transportation, it will be critical to ensure this transition benefits American workers in both the short and long term and enhances U.S. competitiveness and economic security. Unless comprehensive policies are passed into law by Congress that focus on raising standards for U.S. workers and boosting domestic manufacturing, we will continue to fall behind in production of EVs and union jobs in auto sector will be eroded.

A three-pronged approach is required to achieve these goals including robust investments in EV infrastructure such as charging stations, supporting tax subsidies to incentivize consumers to purchase EV's, and targeting investments towards retooling facilities. We commend Congress and the Biden Administration for passing the bi-partisan Infrastructure Investment and Jobs Act (IIJA) which contains historic investments in EV infrastructure including \$7.5 billion for EV charger infrastructure, \$5 billion for EV school buses, and \$6 billion over five years for battery manufacturing, material processing, and recycling. Furthermore, we commend the House of Representatives for approving the Build Back Better Act (BBBA). The BBBA includes the Kildee-Stabenow EV consumer tax credit which makes historic investments in domestic electric vehicle production that are good for the environment, our economy, and working families. IIJA and BBBA, together, make significant strides in addressing all three prongs that are needed for a successful transition. The UAW believes that government subsidies and tax breaks must be paired with a commitment to locate these jobs in the U.S. at comparable wages and benefits to the jobs they replace. Fortunately, the Kildee-Stabenow amendment in the BBBA continues a \$7,500 consumer credit for EVs and adds a \$4,500 bonus for autos assembled in the U.S. by unionized workers as well as a \$500 domestic battery bonus. It is our hope that the Senate passes BBBA and maintains this provision to reward good jobs.

Conclusion

As this committee is extremely aware, climate change presents significant challenges for current and future generations. A large body of scientific research predicted for decades that climate change would increase the number and strength of extreme weather and climate events such as heat waves and droughts. Unfortunately, these predictions have already been proven right by mother nature, and we all have a responsibility to take action to mitigate its impact.

To lead the future, electric vehicles and other green technologies must be harnessed to create good U.S. union jobs where workers have a voice on the job. It is important to ensure all manufacturing workers can join a union free from intimidation by employers seeking to maintain the status quo. Jobs building cleaner vehicles must pay family and community-sustaining wages and provide benefits that workers can count on to care for themselves and their loved ones.

The transition from traditional gas-powered engines will require smart planning and public resources. Even with billions in planned investments, auto companies are relying on public subsidies and other policies to promote sales, transform production capacity, and speed up profitability for EVs. Strategic government support is a crucial tool for strengthening American innovation and manufacturing capacity. As previously noted, massive public investments have been in auto producing nations around the globe. There is a vital role for public policy as we cannot rely on the private sector to make all the necessary investments. Therefore, we support public investments in U.S. manufacturing. But if the public is going to foot the bill, the public must get economic benefits in return in the form of domestic investments and quality union jobs. To make EVs work for American workers, we need policies that promote domestic manufacturing and quality union jobs.

We stand ready to work with this subcommittee and all other stakeholders to ensure the transition is good for working people, the U.S. economy, and our planet. Thank you for considering the views of autoworkers. I look forward to answering your questions.

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Josh Nassar has served as the Legislative Director for the United Auto Workers since December 2011. The legislative department is responsible for implementing the union's policy agenda and designing legislative strategy on labor, trade, environment, health care, defense, energy, tax policy and other issues. He works closely with members of Congress, the executive branch, and stakeholders.

Mr. Nassar previously worked as the assistant legislative director for the Service Employees International Union. He also worked as the vice president for federal affairs at the Center for Responsible Lending and served as legislative assistant for Congresswoman Jan Schakowsky. He has testified before Congress numerous times.

Mr. Nassar earned a bachelor's degree from Skidmore College and holds a master's degree from CUNY Graduate Center. Mr. Nassar and his wife, Amy, live in the District of Columbia with their daughters, Naomi, Justice, and Janis.

Chairwoman STEVENS. Great, thank you, Josh. And with that, we'll hear from Ms. Black-Watson virtually.

**TESTIMONY OF MS. MARCIA BLACK-WATSON,
INDUSTRY ENGAGEMENT DIVISION ADMINISTRATOR,
WORKFORCE DEVELOPMENT, MICHIGAN DEPARTMENT
OF LABOR AND ECONOMIC OPPORTUNITY**

Ms. BLACK-WATSON. Good morning. I apologize for not being able to be there. My intention was—U.S. 23 North has been shut down, and I am sitting on the side of the road with my hazard blinkers on. But I'm happy to be before you this morning.

So Chairwoman Stevens and the distinguished Members of the Subcommittee, thank you so much for the opportunity to testify at this important hearing to explore the workforce needs of the mobility and electrification industry. My name is Marcia Black-Watson, and I serve as Industry Engagement Director for the Michigan Department of Labor and Economic Opportunity Office of Employment and Training. Our agency, also known as LEO ENT, develops customized workforce solutions for both businesses and individuals, including those individuals with disabilities. We accomplish this through a myriad of programs hand-in-hand with partners at the Federal, State, and local level.

Recognizing the importance of a future of mobility by executive order, Governor Witmer created both a council and an Office on Future Mobility and Electrification and the position of Chief Mobility Officer within our department. The council, who was responsible for public policy recommendations that will maintain Michigan's leadership in mobility and electrification cited in their 2020 report that industry is expected to need 12,000 new workers by 2030. Already since 2019 more than 15,000 mobility and automotive manufacturing jobs have been created, many supporting increased EV manufacturing right here in Michigan.

So as mobility and electrification continues to develop, investments in manufacturing, technology, and testing are leading to significant growth that we've heard about earlier in our State, expanding opportunities for companies, investors, and workers alike. Michigan is positioned—we have positioned ourselves to be at the center of that growth by proactively preparing the talent needed for current emerging and future jobs and career pathways.

Now, one such effort at the State level is the Michigan Revolution for Electrification of Vehicles, also known as the Michigan EV Jobs Academy, which is the State of Michigan's initial \$5 million 5-year effort supporting an employer-led collaborative approach. This approach is designed to respond to specific knowledge and skill demands of the industry. LEO ENT competitively awarded these grant funds to the Southeast Michigan Community Alliance's Workforce Intelligent Network, also known as SEMCA WIN, to sustain and expand the academy's multiple collaboratives.

The SEMCA WIN partnership with LEO ENT leverages the Michigan Alliance for Greater Mobility Advancement, or MAGMA. It is an existing collaborative established in 2009 to address skill gaps among professional workers such as technicians and engineers needing training to design and build hybrid vehicles. MAGMA has a governing board of OEOs, suppliers, and educational institutions,

and the academy leans on MAGMA's experience, their established structure, leadership, and employer champions for the development of its collaborative.

Using a multistep supply chain approach to workforce development, the academy is focused on closing skill gaps across the State and serving historically underrepresented or underserved populations while creating a comprehensive end-to-end talent pipeline. This will be done by the identification of projected job openings, skills, and competencies by reskilling, upskilling, and training both incumbent workers and jobseekers; career awareness, exploration, promotion, and advancement opportunities of in-demand occupations as well.

A recent survey of the academy employers identified top in-demand entry-level, middle-skilled, and high-tech jobs. This is from assemblers up to the career matter to electrical engineering technologists. The academy will deliver measurable return on investment for both employers and learners. Initial outcomes include enrolling about 700 learners into training, close to 500 completing training, and nearly 50 percent of those obtaining new employment.

So by working collaboratively across both private sector and the public sector, we will continue to encourage EV adoption in Michigan, support our workforce, and build our manufacturing core. So thank you for this opportunity again to testify today on this important topic, and I look forward to any questions that you may have.

[The prepared statement of Ms. Black-Watson follows:]



**U.S. House Science, Technology, and Space Committee
Subcommittee on Research and Technology
U.S. House of Representatives**

**Michigan Field Hearing:
Building a Workforce to Navigate the Electric Vehicle Future**

**Written Testimony:
Marcia Black-Watson
Michigan Department of Labor & Economic Opportunity**

Chairwoman Stevens, Ranking Member Feenstra, and distinguished members of the subcommittee, thank you for the opportunity to testify at this important hearing to explore the workforce needs for the mobility and electrification industry.

My name is Marcia Black-Watson and I serve as Industry Engagement Director for the Michigan Department of Labor and Economic Opportunity, Office of Employment and Training (LEO-E&T). Our agency develops customized workforce solutions for businesses and individuals, including those with disabilities. LEO-E&T supports employers and businesses by:

- Partnering to recruit, upskill and retain valued employees;
- Providing incentives to increase the bottom line while building an inclusive and diverse workplace; and
- Helping connect employers with job seekers to meet their needs.

We accomplish this through a myriad of programs hand-in-hand with a number of partners at the federal, state, and local level.

Michigan remains the center of high-tech electric vehicle production in the U.S.

Since 2020, the industry has seen a rise in electric vehicles (EV), and it has been projected by Bloomberg New Energy Finance that EV sales will quintuple between 2018 and 2025. Michigan's auto manufacturers have already identified strategies to lead in this growth. Recognizing the importance of the future of mobility, Governor Whitmer signed Executive Order 2020-2 creating the Council on Future Mobility & Electrification (CFME) to develop public policy recommendations that will maintain Michigan's leadership in advanced mobility and electrification. Simultaneously, the new Michigan Office on Future Mobility and Electrification (OFME) and position of Chief Mobility Officer were created within LEO.

According to a 2020 report from the CFME, Michigan's Automotive Mobility and Vehicle Electrification industry is expected to need 12,000 new workers by 2030.¹ More than 15,000 mobility and automotive manufacturing jobs have been created since 2019 - many supporting increased electric vehicle manufacturing here in Michigan.

Recently:

- GM has made its largest investment in company history in its home state of Michigan, announcing plans to spend nearly \$7 billion to convert a factory to make electric pickup trucks and to build a new battery cell plant, which will create up to 4,000 jobs in Lansing and keep another 1,000 already employed at an underutilized assembly plant north of Detroit. GM located its first fully dedicated electric vehicle assembly plant in Hamtramck, with a commitment of 2,200 jobs
- Stellantis is building JEEP plug-in hybrid models at the first new assembly plant in Detroit in three decades as part of an investment creating 6,433 jobs in Michigan, including more than 4,100 for Detroit residents.
- Ford announced a new \$250 million investment and 450 direct jobs across three southeast Michigan facilities – Rouge Electric Vehicle Center, Rawsonville Components Plant, and Van Dyke Electric Powertrain Center – to support F-150 Lightning production capacity increase. Ford is also establishing a new global battery center of excellence – called Ford Ion Park – in southeast Michigan, which will be home to a cross-functional team to drive high-volume battery cell delivery, better range and lower costs for customers as well as Michigan Central, a \$750 million investment for a 1.2 million square foot campus in Detroit providing a dynamic urban ecosystem to co-create mobility solution.
- Manufacturers, suppliers and R&D facilities are also choosing Michigan with:
 - XL Fleet opening its new Fleet Electrification Technology Center in Wixom
 - Magna International building a state-of-the-art facility in St. Clair to support GM's new GMC Hummer EV.

As automotive mobility and electrification continues to grow and develop, investments in manufacturing, technology and testing are leading to significant growth, expanding opportunities for companies, investors and workers. Michigan has positioned itself to be at the center of that growth by proactively preparing the talent needed for automotive mobility and electrification current, emerging, and future jobs and career pathways.

Michigan, being the heart of the automotive industry, is in prime position to effectively drive state-wide solutions that address the evolving skills and competencies needed for automotive mobility and electrification workforce development.

According to the Economic Policy Institute, the shift to all-electric vehicles could create more than 150,000 U.S. jobs by 2030². These are jobs across a variety of interrelated industries and sectors due to the continued transition from internal combustion engine (ICE) equipped vehicles to full battery electric vehicles. And in Michigan, where nearly

¹ Council on Future Mobility & Electrification, [2020 Report](#)

² EPI.org, September 22, 2021 article: [“The Shift to All-Electric Vehicles”](#)

1-in-5 workers is either directly or indirectly employed by the mobility industry³, the impact is significant. It is imperative to be proactive with talent pipeline development to support the economic stimulation, which will occur throughout this technological evolution.

MiREV: An investment in Michigan's current and future workforce supporting long-term growth for our state's employers in the automotive mobility and electrification industry.


 The logo for MiREV, featuring the word "MiREV" in a bold, orange, sans-serif font. The "i" and "e" have a slight curve, and the "V" is a simple, blocky shape.

The Michigan Revolution for the Electrification of Vehicles (MiREV) is the State of Michigan's initial \$5 million, five-year effort supporting an employer-led collaborative (ELC) approach designed to respond to specific knowledge and skill demands of the automotive mobility and electrification industry. The Michigan Department of Labor and Economic Opportunity, Office of Employment and Training competitively awarded grant funds to Southeast Michigan Community Alliance's Workforce Intelligence Agency (SEMCA/WIN) to sustain and expand MiREV employer-led collaboratives.

SEMCA is the local workforce development board area or Michigan Works! Agency for Wayne County (excluding the city of Detroit) and Monroe County, administering various human services programs. Since 1996, SEMCA has been a leader in talent development programs and partners with various community organizations and contractors to serve residents. WIN is a partnership of seven local workforce boards (referred to as Michigan Works! Agencies) and 10 community colleges in southeast Michigan and is a division of SEMCA. WIN specializes in fostering collaboration among talent partners, including workforce development, community colleges, four-year post-secondary institutions, K-12 schools, economic development organizations, government, community-based organizations, employers and others.

The SEMCA/WIN partnership with LEO-E&T leverages the Michigan Alliance for Greater Mobility Advancement (MAGMA), an existing collaborative established in 2009 to address skills gaps among professional workers, such as technicians and engineers needing training to design and build electric and hybrid vehicles. MAGMA's governing board consists of five original equipment manufacturers (OEMs), five suppliers, and six educational institutions. MiREV leans on MAGMA's established structure, leadership and employer champions for the development of the MiREV ELC.

ELCs are a proven talent development approach in which multiple employers collaboratively address their most critical workforce needs while learners get better employment outcomes, including upward mobility opportunities, through the development and alignment of education and training programs. By joining forces, via

³ MichAuto.org, March 26, 2021 article: "[Report: Michigan's Mobility Industry](#)"

ELCs employers are able to meet workforce needs faster and more effectively than individual employers could do on their own.⁴

In addition to MAGMA, Michigan has a long history of success using the ELC model as a workforce development strategy to address the unique talent needs of various industries. LEO-E&T has initiated and/or supported ELCs in the Manufacturing, IT, Healthcare, Energy and Mobility industries. For example:

- The Michigan Advanced Technician Training Program (MAT2), established in 2013, has 22 network companies and serves approximately 104 apprentices across two occupations, including Mechatronics Technician and CNC Machining Technician with an 85 percent employment retention rate.
- The Michigan Energy Workforce Development Consortium (MEWDC), established in 2009 to address workforce issues that are crucial to building and sustaining Michigan’s energy industry, has more than 20 employers with more than 400 apprentices trained across 18 occupations, including Overhead and Underground Electric Line-Worker, Substation Operations, and Gas Utility Specialist.

- The West Michigan Health Career Council (WMHCC), established in 2017, has several employers including four large health systems. The council has trained more than 400 apprentices across four occupations including Medical Assistant, Sterile Processing Technician, Surgical Technologist and EEG Technician and are working on launching two additional programs.

Employer-Led Collaborative	Employers	Apprentices/ Trainees	Occupations
MAT ²	22	104	2
MEWDC	20	400	18
WMHCC	5	400	4

The MiREV ELC will initiate the MiREV Academy focused on alignment of closing skill gaps through attracting, upskilling and reskilling an automotive mobility and electrification workforce across the state, serving historically underserved populations while creating a robust talent pipeline.

The vital contributions made by MiREV stakeholder partners help connect job seekers with good paying career pathway opportunities while helping employers address their critical workforce needs.

The MiREV ELC approach is the innovative, yet comprehensive, workforce development strategy required to meet the needs of a variety of interrelated industries

⁴ Workforce.com, July 22, 2011 article: [“O Captain! My Captain! I Know Not How to Build an App for That”](#)

and sectors comprising automotive mobility and electrification. Currently in its initial phase, the MiREV collaborative is comprised of more than 100 stakeholder partners and seven sub-collaboratives working together to strengthen and upskill Michigan's automotive mobility and electrification workforce.

Through these strategic partnerships of employers, educators, workforce development, economic development and other stakeholders, an accessible platform that accelerates the capacity to develop and align education and training curriculum with the industry's rapidly growing talent needs is being created. This talent pipeline development strategy collaboratively builds supply chain-based high-performing industry, education and workforce partnerships who deliver a measurable return on investment for the end customers – both employers and learners. Specifically, initial MiREV stakeholder partners include:

- Fifteen employer partners with 410 immediate job openings and 1,300 projected job openings over the next three years, including large employers, small employers and labor unions.
- Fourteen Institutions of Higher Education offering at least 42 customizable and scalable automotive mobility and electrification earning opportunities, including short courses, certifications and degree programs.
- Eight local workforce development boards (Michigan Works! Agencies) supporting job seekers with automotive mobility and electrification career awareness, exploration and recruitment.
- Multiple cross-sector stakeholder groups, such as Center for Automotive Research (CAR), National Advanced Mobility Consortium (NAMC), MICHAuto, Michigan Occupational Deans Administrative Council (MODAC), Southeast Michigan Council of Governments (SEMCOG), and many others.

Industry leaders working together, in partnership with state government and other stakeholders, are paving the way for economic development – providing career pathways to expand customized talent solutions and strategies to address skill gaps, career advancement, turnover, and retention.

The MiREV collaborative and sub-collaboratives will ensure a comprehensive end-to-end talent pipeline is created by using a supply chain approach to workforce development, including:

1. Demand planning; identification of projected job openings
2. Identification of competencies, credentials and other hiring requirements
3. Reskilling and upskilling incumbent workers
4. Training opportunities for job seekers interested in automotive mobility and electrification industry
5. Development and identification of career pathways that provide advancement opportunities within and outside of ELC companies

6. Career awareness, exploration and promotion of automotive mobility and electrification industry occupations to Michigan's future workforce

Using supply chain management principles, employers play an expanded leadership role as "end-customers" of education and workforce partnerships. Based on the U.S. Chamber Foundation's, Talent Pipeline Management® (TPM) initiative, the framework above is composed of six strategies that, when implemented in a particular sequence, make for a talent supply chain approach. Each strategy is designed to build off one another and support employers in developing a more data-driven and performance-driven approach to improving education and workforce partnerships.

MiREV: Delivers a measurable return on investment for both employers and learners.

Initial Academy outcome metrics include enrolling approximately 700 learners into training, with close to 500 completing training, and nearly 50 percent of those trained obtaining new employment – building a talent pool of technicians and engineers required to develop, maintain, and repair electrified vehicles. A recent demand data survey from the MiREV employers identified the top in-demand occupations:

- Maintenance and Repair Workers
- Assemblers and Fabricators
- First-Line Supervisors of Mechanics, Installers and Repairers
- First-Line Supervisors of Production and Operating Workers
- Industrial Machinery Mechanics
- Electrical and Electronic Engineering Technologists and Technicians

MiREV participants who complete training will earn credentials including certificates and degrees for high-demand, high-skill, and high-wage occupations in direct alignment with Governor Whitmer's Sixty by 30 goal to increase the number of Michiganders with a post-secondary credential (a high-quality industry certificate, associate degree or higher) to 60 percent by 2030.

Michigan recognizes people are one of the state's greatest strengths and has been a leader in expanding opportunities for all residents. Given the climate of volatile work participation rates and talent shortages, strategic recruitment and engagement of underrepresented populations is critical to MiREV success. Underrepresented populations comprise a massive untapped talent pool that must be proactively reached if MiREV is going to be successful in creating a robust talent pipeline. Minimally 35 percent, or 235, of the MiREV participants will come from underrepresented populations including youth, veterans, women, people of color, ex-offenders, and persons with disabilities. Focused outreach efforts are required to attract a higher percentage of underrepresented populations to pursue new technical training and educational programs offered through the Academy. Community colleges and Michigan Works! Agencies have workforce professionals who connect with industry, secondary and

postsecondary education partners for career awareness, exploration, outreach, and recruitment activities.

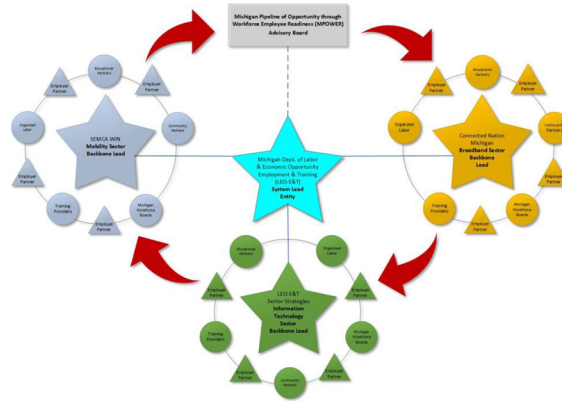
Following the launch and implementation of MiREV's first phase, it is anticipated the numbers of trained and retrained individuals will continue to grow significantly. MiREV positions Michigan for greater investment at the federal level. LEO-E&T applied to the Economic Development Administration's (EDA) American Rescue Plan Act (ARPA) Good Jobs Challenge Grant program for \$25 million on February 8, 2022. EDA's American Rescue Plan Good Jobs Challenge aims to get Americans back to work by building and strengthening systems and partnerships that bring together employers who have hiring needs with key entities to train workers with in-demand skills that lead to good paying jobs. The proposed Michigan Pipeline of Opportunity through Workforce Employee Readiness (MPOWER) will create ELCs in three industries crucial for the advancement of EV and infrastructure development necessary to reach national goals of 50 percent of EV sales by 2030. Based upon EDA direction, LEO-E&T's plan builds in subrecipients from each of the industries (Mobility, Information Technology and Broadband) along with a subrecipient who is focused on and can provide consultation, training and technical assistance on diversity, equity and inclusion for all program partners. If awarded, the MiREV Academy will spearhead the MPOWER mobility efforts, providing additional investment to attract, train and retain a skilled automotive mobility and electrification workforce in Michigan.

Our collaborative approach brings all stakeholders to the table.

By working collaboratively across both the public and private sector, we can continue to encourage EV adoption, support our workforce and build our manufacturing core.

In Michigan, we are working together to build the pipeline to fill critical jobs in EV-related industries today and in the future – and at the same time, building a stronger state economy for current and future generations of Michiganders.

Thank you again for the opportunity to testify today on this important topic. I look forward to addressing any questions you might have.



Marcia Black-Watson
Industry Engagement Director
Michigan Department of Labor and Economic Opportunity-Workforce Development



Marcia S. Black-Watson serves as the Industry Engagement Division Administrator for the Michigan Department of Labor and Economic Opportunity, Workforce Development (LEO-WD). Ms. Black-Watson leads a team that promotes demand-driven workforce development strategies to help attract, retain, and develop talent in high growth, high wage industry sectors. The LEO-WD Industry Engagement Division engages employers; the Michigan Works! System; educational entities; economic development organizations, and other local, state, and federal partners to execute programs and initiatives that produce successful recruitment, training, placement, and retention outcomes. The division administers programs such as the Community College Skilled Trades Equipment Program (CCSTEP), Carl D. Perkins Postsecondary (Perkins V), Going PRO Talent Fund, Michigan Industry Cluster Approach (MICA), Michigan Learning and Education Advancement Program (MILEAP), Michigan Rural Enhanced Access to Careers in Healthcare (MiREACH), Michigan Revolution for Electrification of Vehicles (MiREV), State Apprenticeship Expansion (SAE), and Talent Development Liaisons (TDLs).

Marcia has worked in the workforce development field since 1998, spearheading a number of state-level taskforces, projects, and initiatives focused on meeting the workforce demands of industry. She has a Bachelor of Arts degree in Materials and Logistics Management with a minor in Accounting from Michigan State University. She is a Certified Business Solutions Professional and has served on several boards and advisory committees, including Center for Advanced Automotive Technology (CAAT) National Visiting Committee; Baker College – College of Business Advisory Board; Flint Genesee Job Corps Industry Advisory Council; Michigan Academy for Greater Mobility Advancement Governance Board; Michigan Apprenticeship Steering Committee, Inc. (MASCI); Michigan Energy Workforce Development Consortium (MEWDC) Executive Committee, and the Michigan Talent Pipeline Management Academy Steering Committee.

In January 2021, Marcia received the State of Michigan Symbol of Excellence Award in recognition of securing \$45 million in competitive federal grants, which will help launch new apprenticeship initiatives and create customized education and training solutions that result in industry-recognized credentials and accelerated career pathways.

Chairwoman STEVENS. Well, thank you to our witnesses. And allow me to say for the record I'm in my 4th year of chairing this Subcommittee, and never have we had such a dedicated witness. And if there is any member of the press here, let it be captured beyond the record the true dedication that our professionals and our stakeholders have to this technology, to the workforce, and to the training of Michigan workers. This is absolutely remarkable.

With that, though, since we are joined by a distinguished colleague of mine from the Michigan delegation and also from the Energy and Commerce Committee, I'd like to start with 5 minutes of questioning from my colleague Congresswoman Debbie Dingell. Thank you.

Mrs. DINGELL. Thank you, Madam Chair. I would like to start with Mr. Nassar from the United Auto Workers if he can hear me. Mr. Nassar, what are the potential consequences for the United States' autoworkers if the United States embraces a rapid transition to EVs without significantly scaling up domestic manufacturing capabilities?

Mr. NASSAR. Well, I mean, if we don't have the demand and we don't have the infrastructure, the sales simply will not happen to the degree that we need them to, and ultimately, the EVs will be built elsewhere and will be imported. So, I mean, what we really, really need to do is put policies—lower the cost of EVs so consumers can—more consumers can buy them, and we absolutely have to create the infrastructure and help the retooling to make this happen. But I want to reemphasize, when Federal money—when taxpayer money is given to companies, we think that they have a responsibility to create good jobs and to maintain good jobs in the United States.

Mrs. DINGELL. So let me build on that. Do you think that the current suite of Federal initiatives is paying enough attention or we've done what we need to do to get to even that 50 percent goal for 2030? And then on top of that, do you think we're doing enough for the workers' challenges and training?

Mr. NASSAR. The answer is no, unfortunately, to those questions. I don't think we're doing enough. I think the House took some important action but, you know, there's not a bill on the President's desk to really lower the cost of EVs and to have, again, that support for the supply chain and for the infrastructure. So I think a heck of a lot more investment is needed and a lot more really what I would say is industrial policy.

The other thing, too, is that we need to make sure that these—the battery jobs are good union jobs. They're auto jobs, no doubt about it, they're moving a car forward, but there's—it's not assured by any way that they're going to be the good middle-class union jobs that they need to be. So there's a lot of open questions out there, a ton of work to be done. I hope that answers your question.

Mrs. DINGELL. Well, it does partially. I think that a lot of people don't understand that there are a lot of things that have to happen to get to that goal. And then I want to build on that last point that you were making about what can be done to mitigate the worker displacement and then ensure that these new jobs are good-paying jobs and that are providing worker protections, which many workers are worried about.

Mr. NASSAR. Well, the first most fundamental thing is making sure workers have an ability to have a voice on the job because what we're seeing now not just in the auto industry but across the economy is a really hostile atmosphere toward workers having a voice. And workers having a voice, you have more investment, you have better jobs, you have better retention. That's just a fact.

But what we're seeing now is our labor laws, you know, they're so anemic, the penalties are so weak for breaking the law that it creates little disincentive for employers who are just hell-bent on not having a unionized workforce with a voice. So passing the *PRO Act*, which the House has done, the Senate really needs to do that.

Just one thing, for example, captive audience meetings, in most union drives, the vast majority of them where employers are opposed, they'll have daily meetings where they force workers to go in there and just get lectured about all the harm that will happen to them and their career and their lives if a union is there. And it really wears people down and it's obviously very intimidating. That's something that the *PRO Act* would eliminate, would not make them mandatory anymore. So striking labor laws, giving workers a voice is the first fundamental step, but again, you need these, you know, suite of other policies to really make sure those investments and those jobs are going to be in the United States.

Mrs. DINGELL. Thank you. Not that I'm testifying, but I want to add mineral development to that list and battery R&D.

Let me go to Ms. Mefford. The U.S. Department of Transportation has launched its sixth round of funding to establish alternative fuel corridors across the United States. The Administration has also announced the new NEVI Formula Program, which will provide nearly \$5 billion over the next 5 years to help States create this network of EV charging stations that we need along these routes.

First, can you articulate why it's important for the economy that the United States continue to push for the electrification of transportation infrastructure, including through the creation of these charging stations across the country?

Ms. MEFFORD. Sure. The infrastructure really plays such a critical role in the growth of the market as a whole. Consumer confidence, consumer ability to really—to purchase a vehicle, make sure that it serves all of their needs, and that they feel really comfortable and confident purchasing that vehicle is very dependent on the infrastructure access. I have these conversations often as I move through markets and around the country. Consumers are very excited about the EV products coming to market. The auto industry is doing an amazing job designing and manufacturing really cool vehicles that people want. The hesitation at this moment is still what does the infrastructure piece look like? So I'm very excited about the plans and the investment in building out these infrastructure corridors.

While most charging is—still happens at the home, people want to know they can get from place to place and drive and be mobile in their communities and their lives as they normally would with a different type of vehicle. So infrastructure plays a key role in the expansion.

Mrs. DINGELL. So I'm going to build on that. So I'm going to submit questions for the record because I had three more for you and we won't get it, but I don't think most people understand that most people buying EVs right now are for short distances. And what we're trying to do, by getting to that zero emission by 2030 is that, you know, the F-150 will do everything the F-150 can do now, including getting from here all the way up to the Upper Peninsula. So can you be even clearer that they want to know that they can get a charge if they needed if that—

Ms. MEFFORD. Yes.

Mrs. DINGELL [continuing]. If they're going to take a longer trip?

Ms. MEFFORD. Yes, so, you know, I'm fortunate to be able to talk to really a lot of consumers in convenings and have been over the last 10 years. And this market is—has shifted so much since that time. When the Volt came out, it was really designed for the average driver going 40 miles a day, right? So consumers want to have a vehicle that fits their complete lifestyle, and they just want it to be electric. So go—being able to—you know, Michigan, the amazing tourism State, they want to be able to go from southeast Michigan up to Mackinac. They want to be able to go across the State to the west side of the State. They want to be able to live their lives as they normally would just in an electric vehicle. That's where those corridors and the thoughtful placement of fast charging, as well as level 2 charging and the accessibility of that charging becomes really critical.

I travel a lot for my work, and I'm on the road a lot, and I—one of my considerations is where are those chargers located. How does it feel when I'm there? Is it well-it? Are there security cameras? What's happening to me as a consumer when I'm interfacing with that charging station?

Again, infrastructure is just starting to come to the market, but what's been in place at this point has been there for a while in many instances, not uncommon for 25 percent of charging stations to not be operable when you get there. That's a huge issue. That's a huge issue for a consumer. So the installation is a piece of it, the service and maintenance is also a critical piece of it, but for me also the security and the thoughtful, again, design and planning of where the stations are and what that consumer experience looks like will help accelerate this market.

The vehicles that are planned and coming out and being made here—many here in Michigan, I mean, it's amazing. And they're so exciting, but we have to shore up that infrastructure piece to get those vehicles with consumers.

Mrs. DINGELL. Thank you. I'm out of time, and I yield back, Madam Chair.

Chairwoman STEVENS. Thank you. And with that, the Chair will recognize herself for 5 minutes of questioning.

We do have other Members of Congress participating in this hearing who will be asking questions, and I will be recognizing them next.

I also wanted to take a minute of personal privilege to recognize the Mayor of Plymouth, Nick Moroz, who has joined us as well. Plymouth, Michigan, has certainly been in the list of communities that has been eager to be an EV infrastructure adopter and has

kept their eyes on the prize of this proliferating technology opportunity.

And also as a point of personal privilege, given the nature of this hearing, EVs are complicated, they are new, exciting technologies, they are a moonshot of the 21st century, something that we recognize is coming from a place called home, a place called Michigan, but are also a part of the broader plight of our automotive industry to achieve zero emissions, right. It is common to say in industry zero emissions, not just electric vehicles but also recognizing the potential that comes from hydrogen technologies, similar development of skateboards and I guess you want to say technology but also just manufacturing.

And that also has a huge presence here in southeastern Michigan from Forvia, otherwise known as Faurecia, a large tier 1 supplier producing hydrogen platforms for vehicles, Noble Gas, which exists in Novi. And we also know in the *Infrastructure Investment and Jobs Act* that hydrogen hubs were designated—received designated funding and certainly want to see Michigan in line for that as well, always in which we're going to win the future.

But with that, the U.S. Department of Transportation, as the previous questioner had mentioned, has announced that NEVI Formula Program to provide nearly \$5 billion in funding over the next 5 years to help States create a network of EV charging stations. And so just to dive a little deeper, Ms. Mefford, just any other things that you can mention about workforce barriers? And certainly in your testimony you give a lot of notes of inspiration, which we appreciate, but any of the workforce barriers that you could touch on to overcome getting these EV charging stations into communities?

Ms. MEFFORD. Certainly, thank you. I—you know, our training program is really designed for existing experienced licensed electricians, and in States without licensing, those that have 8,000 hours. So I think goal No. 1 was really to upskill existing electricians to work very safely, understanding that we're building skills, we're building a new technology and EV charger infrastructure on top of existing skill level. So that was really one of those—one of the first goals.

The second goal of course looking at not only the EV pipeline of work coming but looking at the integration of solar, of energy storage, of security, of grid resiliency, all of this is in that electrical space. So it really does need to be a parallel effort to onboard new folks into an apprenticeship.

One of the things I've seen that's worked extremely successfully, especially in communities that may not be interacting with the construction industry as a whole, are qualified pre-apprenticeship programs where they're experiential in nature and they let an individual look at the electrical pathway, connect to it, have on-the-job experience, all of it, and explore whether this is really for them and then also be connected to those meaningful Department of Labor-recognized apprenticeships. So it's truly a career pathway.

One of the barriers at that point can be math skills. It absolutely requires a high level of algebra, geometry, and trigonometry competency to be a successful electrician at this level. So those qualified pre-apprenticeship programs and even partnerships with our

community college network can really help address any of those deficits that may occur that might be a barrier for an individual coming into a qualified pre-apprenticeship, moving into apprenticeship, and then into a successful career as an electrician. And the—you know, the goal is to get them the training and the quality—the qualities and qualifications where they can work in any electrical sector, so it is truly a career pathway.

Chairwoman STEVENS. Well, that is certainly quite powerful.

And, Mr. Nassar, in your written testimony you had referenced the decision that I've been eying very closely for Oshkosh Defense to move their awarded \$6 billion contract—let me say that again for the people in the back, \$6 billion contract to build the next generation vehicles for the U.S. Postal Service to a totally new non-union plant instead of having UAW members in Wisconsin carry out this lucrative contract.

We have seen the pitfalls that happen when some auto manufacturers look to reduce their labor costs by building EV manufacturing facilities in nonunion-friendly places where, you know, right-to-work laws allow companies to shortchange their workers on wages, benefits, and workplace safety standards. And certainly, you know, the Congresswoman—the Chair is enthusiastic for the *PRO Act*, but this egregious decision that I reference is one of the reasons why I introduced the *Union Autoworkers Job Protection Act*. This is a bill that require bids and contracts to build motor vehicles for the Federal Government to stipulate in which plants motor vehicles will be made or assembled, so if a contract awardee wants to move production, they must get written permission from the executive agency and provide the same-day notification to impacted labor unions when they seek permission.

So, Mr. Nassar, how can policy work to reverse the migration of EV manufacturing to the south and reward employers who are doing right by their workers?

Mr. NASSAR. Well, I mean, you know, in addition to kind of just have workers having a stronger voice in general, I really think there has to be—you know, I like your legislation. There has to be a real, you know, intentional effort to ensure that companies who are benefiting from large public contracts, you know, have an accountability for what they're doing with their workforce. As far as we can tell—I mean, so there's an incumbent workforce that's been there for, you know, over 80 years in Oshkosh that the company apparently is deciding to ignore, and that's just unacceptable.

And so what has to happen is, I mean, we've got to have far more transparency, and there really has to be—this has to be taken into account. It needs to be a factor. Like how are the taxpayer dollars, how are these investments going to impact the communities, you know, where manufacturing is taking place and the actual workforce? So just a far more deliberate and kind of across-government approach is needed.

There's a lot of work to do in this area. It's a decision that we hope the Postal Service in Oshkosh, you know, will change and revisit and do the right thing here.

Chairwoman STEVENS. Great. Thank you so much. And, Ms. Black-Watson, what are the barriers to entry and retention for women and people of color working in the EV automotive elec-

trician and construction occupations, and what steps is the State of Michigan taking to provide more opportunities for future EV workers from underrepresented groups?

Ms. BLACK-WATSON. Thank you for that question. Yes, the barriers really stem from a number of different factors. One is awareness and exposure to opportunities of these careers and career pathways that oftentimes individuals in underrepresented population groups are not aware of. And then—so really being very intentional and strategic about outreach and promotion, and that's why some of our efforts are really focused on working very closely with our workforce development boards, the 16 across the State or the Michigan Works! agencies, as well as the community colleges that have access to individuals with underrepresented populations.

Another barrier oftentimes are sort of the upfront requirements, and some of the employment barriers that really exist if you're thinking about—I mean, we've seen this a lot with the pandemic, childcare and transportation to these employment opportunities, and so our efforts really stem toward, one, assessing and identifying these barriers; and then two, making sure that there are supportive services that are available to mitigate the barriers, not just to employment but also to education and training.

We've talked about the various modes of training, including courses and programs, degree programs, as well as registered apprenticeship programs. So we certainly want to make sure that underrepresented populations who haven't been able to enjoy the benefits of education and training and the good-paying jobs that are associated with this industry have the ability to do so by mitigating those barriers from all different facets.

Chairwoman STEVENS. Great, thank you so much. And I am out of time, but I certainly don't want to overlook Mr. Cruz and, you know, the role you are playing in our EV workforce, so we will dogear that. And I will—or I will turn to my colleague Congressman Tonko from New York, who's joined us virtually for 5 minutes of questioning. Thank you so much for being here, Congressman Tonko.

Mr. TONKO. It's my pleasure, and thank you, Chair Stevens, for holding what I believe is a very important hearing on a critical topic, a vital topic. And I do appreciate your enthusiasm.

America's auto industry has a strong history with union labor. Good union autoworkers jobs have supported the building and the strengthening of our American middle class. It is crucial that we continue this tradition as we move forward into the next era of transportation.

As part of that, it's also very important that we make certain that the EV workforce is representative of our diverse society and that everyone has access to good-paying, secure jobs in this sector. So I'm proud and pleased to see community colleges represented here today. I think these institutions are invaluable to the training of skilled technical workers for the growing clean energy sector. In my district, Hudson Valley Community College is doing a fantastic job with the critical mission of training people for clean energy and advanced manufacturing jobs, and they have emphasized that they're going to make certain that the diversity of my district is well-represented in that workforce pipeline.

So, Mr. Cruz, can you share with us more about the role of community colleges in developing a diverse technical workforce and what further support would be helpful toward that mission?

Mr. CRUZ. Yes. First of all, there is—there are obviously some—excuse me, there are obviously some barriers to get, you know, more students into the community college, and some of those have to do with what Mrs. Blackstone—Black-Watson was talking about, and that's the barriers of transportation, the barriers of childcare, you know, giving—or offering an opportunity to pay for an education via a scholarship or a grant, you know, for an individual doesn't necessarily give that person the ability to attend those classes because there are many other problems with—in the underrepresented areas that can be significant barriers to even getting that education.

Additionally, there are some academic barriers that has been stated a little bit here with Mr. Nassar—or, yes, Mr. Nassar and Mr.—and Mrs. Watson that, you know, there's the mathematical barrier. You know, there is—oh, I'm sorry, that was you—that there's a barrier, you know, to the math that's actually required in some of the electrical and some of the pre-engineering classes that are at community colleges. However, that is being mitigated by providing tutors, by providing people that can actually coach, you know, these individuals to be able to, you know, get that background, you know, to be able to continue and finish the courses.

In terms of, you know, recruitment, you know, our community college certainly has, you know, a process and a strategy to be able to go out and do outreach in the lower socioeconomic areas, the underrepresented areas, and we are pushing to make sure that we do offer these areas an opportunity to come to school and have the opportunity to come and, you know, take part in a lot of our educational classes at Macomb.

Mr. TONKO. Thank you. And I understand from IBEW that the Electric Vehicle Infrastructure Training Program is vital to strengthening their members' skills in EV infrastructure installation. So, Ms. Mefford, can you speak to EVITP's role in supporting a union workforce and how the program contributes to equity both in workforce numbers and in access to EV infrastructure?

Ms. MEFFORD. Yes, thank you for the question. EVITP is open to all, so we are really an industrywide program, and we look to certify qualified electricians that are licensed in States with licensing and electricians in States without licensing that have 8,000 hours of experience. We are really looking to support electricians at a high level to make sure that they have specific training for the EV industry to make sure that all those installations are done safely.

One of the things I wanted to just circle back on, too, is some of our efforts. We were fortunate enough to work with Bloomberg Philanthropies American Cities Climate Challenge on 26 cities in the United States to deliver scholarships to qualified electricians. Fifty percent of those scholarships for EVITP training were for women and underrepresented groups. So we are actually currently in the process of doing that right now, but there are over 1,200 scholarships that have been awarded around the country to make

sure that those existing qualified electricians in underrepresented groups are receiving EVITP training.

Certainly, we support union electricians. We support nonunion electricians. We are really looking to create a wonderful standard of safety and competency in the electrical industry to support EV charging.

Mr. TONKO. Thank you. I ran out of my time, I see, but Mr. Nassar, I'll get a question over to you and have you respond in writing, but it was about describing some of the benefits of historically having a unionized automaking workforce in the United States, so if you could share that in written context with the Committee—Subcommittee, I would appreciate it.

And with that, Madam Chair, I yield back, and I applaud your leadership on the issue.

Chairwoman STEVENS. Yes, thank you so much, Congressman Tonko, and thank you for your leadership and always the bright contributions to this Committee and our hearings.

I am really excited to introduce our next Member of Congress who's joining us virtually, a dear friend as well, Congressman Don Norcross from New Jersey.

Mr. NORCROSS. Well, thank you, Madam Chairwoman. And we really appreciate the kind introduction and, more importantly, thank you for holding this hearing. The vision and knowing what this means to our country and to the next generation of workers is incredibly important, and again, we appreciate it. And I wish that all our Members could be here today listening to what is going to be the future. And I know we use that quite often, but this is real.

So I love hearing questions from my colleagues about electricians. Gee, I happen to be one. We have 200 lawyers, God bless them, but we have an electrician. And certainly going to the other 4-year school, which was an apprenticeship, gave me a little bit different view. And I had been following this, been out to Michigan several times, you know, you have a great district, Ms. Haley, and, more importantly, while I was out there, one of the major features we were looking at was the next generation of technology. I was over at GM, the battery technology development of fuel cells. And I Chair, in addition to being on Education and Labor, Tactical Air and Land, which talks about our military and where they're going.

So GM literally is on the cutting edge of the ISV (Infantry Squad Vehicle). It's their next generation of squad vehicle, how it can be electrical. And that technology, as I went through the plant, is just sitting there on display and being put right into not only the cars we're driving on the road, but helping to make sure that our servicemen and women have the best, appropriate vehicles that they can have, and that happens to be electric in many cases.

So when I hear about trained electricians, standards, we see the difficult fight between what they want to do is break down those standards, and this is why this program that, Ms. Mefford, you're talking about, the EVIT program, becomes very personal to me, A, to make sure those who are going to install it have the right training, in addition to making sure that they have a job that pays the right amount and benefits and certainly retirement, but it gets installed correctly because what—I've seen unfortunately what hap-

pens when that doesn't happen. Not only does the worker get injured or killed, but in this case when you go to plug in your car, you want to make sure it's correct and it doesn't blow up, kill you.

So talk to me about those standards that are set into place here and why that's important. Because you mentioned we're taking those who have been through an apprenticeship or a training program 8,000 hours, but this is additional training because of its connection to not only cars but people.

Ms. MEFFORD. Yes, thank you for that question. So EVITP began really as this coalition of stakeholders that really wanted the EV industry to evolve out of safety, right? They wanted to make sure that installations were done safely and at the highest level, and that included automakers and utility companies and the NFPA (National Fire Protection Association) and NEIS (National Electrical Installation Standards) and everybody that needed to look at this to make sure that we were building a program that met all those needs. The goal has always been to make sure that installations are done safely for any market, residential, commercial, public fleet. And it continues to be that today.

So that's why we built this additional credential for qualified electricians that's 18 hours. It speaks to every aspect of the charging infrastructure industry locale, site assessments, the integration of solar, storage, you name it. This market is changing so rapidly. And one of the things that I think is so powerful about the partner advisor group that is still with EVITP today is that they are from industry. So as the industry changes and advances, as charging technology changes and advances, we are able to source that material directly from industry and integrate it into the curriculum, which keeps it fresh. We're on our fourth iteration of EVITP right now. It's a dramatically different course than it was 10 years ago because this is a dramatically different EV industry. It will change again.

I am personally very excited to see the advances in charging technology, bidirectional charging, sequential charging. I think that in 5 years, 3 years we'll probably see a whole different level of charging in vehicle than we are today, and that's really exciting, but that will require us to continue to evolve training and to make sure that qualified electricians and credentialed electricians are the ones that are interacting with this technology because on the other end of it they are consumers, and it needs to be done properly and safely. Thank you.

Mr. NORCROSS. I certainly appreciate, as my time runs out, just to reiterate that the connection to those existing particularly in apprenticeship programs, whether it's the IBEW, which has the largest, is that as it changes—and you mentioned you're already through four changes, it continues to connect to those electricians in the field so they have the latest and safest way of doing it.

And with that, Madam Chairwoman, again, I appreciate the hearing, and I yield back.

Chairwoman STEVENS. Well, thank you, and I think all of us can see here in Oakland County how fortunate we are in the Congress to have such engaged colleagues and eager champions of the topic at hand.

And I want to thank our witnesses for joining us today. As I mentioned in the opening remarks, this hearing is absolutely historic. It is absolutely a part of the House record. It is absolutely a part of a moonshot that we are leading here in Oakland County and throughout southeastern Michigan. And it's also been a little historic because we've had witnesses engage in a hybrid fashion. Again, you know, our deep appreciation to Ms. Black-Watson for her dedication and Zooming in from her car to testify. I think the things that she was able to touch on—and by the way, for those who listened to her opening remarks, her written opening remarks, alongside our other witnesses, were really quite fantastic with some of the charts and the graphics and the deep thinking that the State of Michigan through LEO is bringing to just this one workforce topic on EVs and absolutely needs to be commended and particularly through the lens of diversity, equity, and inclusion, something we hear over and over and over again on the Science Committee. Let's not leave people behind, right? Let's not leave behind our own talent geographically or demographically.

And certainly, you know, I laud the testimony of, you know, our other witnesses from UAW to our training programs here at the community college and those that Ms. Mefford mentioned. So that's the deep gratitude to our witnesses, the deep gratitude to our audience members, particularly our community members as well. We have the—we did have for most of the hearing the head of Oakland County's Economic Development here, as well as the support of our Oakland County Commissioners.

So we will leave the record open for 2 weeks for additional statements from Members and for additional questions that the Committee may ask of our witnesses. I know Congresswoman Deb Ross from the Research Triangle in North Carolina was on for part of the hearing and plans to ask some questions, as well as fellow Committee Member Congressman Bill Foster of Illinois, who had kind of a prehearing to this one in his role on oversight around the R&D needs, the battery needs, the supply chain needs, the technical needs.

So with that, the witnesses are excused, and the hearing is now adjourned.

[Whereupon, at 11:34 a.m., the Subcommittee was adjourned.]

Appendix I

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Mr. Josh Nassar

U.S. HOUSE OF REPRESENTATIVES

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY

SUBCOMMITTEE ON RESEARCH AND TECHNOLOGY

"Building a Workforce to Navigate the Electric Vehicle Future"

Questions for the Record to:

Mr. Josh Nassar

Legislative Director

United Auto Workers

Submitted by Chairwoman Haley Stevens

1. Mr. Nassar, experts have noted that the automotive industry has likely been impacted the most by the global shortage of microelectronics. Auto factories have cut production or even shut down temporarily due to parts disruptions. Growing demand for electric vehicles (EVs) is putting even more pressure on chip supply chain. Industry experts have expressed concern that a prolonged chip shortage could delay the rollout of these new vehicles. **Can you describe the impact the global chip shortage has had on your members?**

Thank you for the question, Chairwoman Stevens. The shortage of auto-grade semiconductor chips continues to have an extremely detrimental impact on UAW members. The shortage has caused layoff and reduced hours for UAW rank-and-file members. It has also hurt their' families and the communities they live and work in.

Sadly, auto-grade semiconductors are not currently manufactured in the United States. Lack of U.S. production made a dire situation worse. Our country was the dominate producer of semiconductors for decades. Of course, this is no longer the case. Decisions by the private sector actors and the failure of policymakers created additional vulnerabilities.

While the impact on light-duty vehicle production has received the most public attention, the shortage has also negatively impacted heavy-duty vehicle production and parts suppliers. UAW members who build construction and agricultural equipment have also lost work because of the shortage. The shortage has caused layoffs, reduced hours, and employment disruptions for many of the more than 750,000 workers in motor vehicle and parts manufacturing. When production declines at an auto assembly plant, it means lost work for a vast network of auto parts suppliers. So far this year, both Kentucky and Indiana have lost around 8% of their vehicle production. Combined, Kentucky and Indiana have more than 160,000 workers in the motor vehicle and parts manufacturing industry.

To be clear, the problem has extended far beyond electric-powered vehicles and products. In fact, IHS Markit Automotive reported that since 2021, an estimated 1.7 million light-duty vehicles were not built due to the semiconductor shortage and related problems.

In recent years, the U.S. typically produces around 11 million vehicles annually with forecasted production for 2022 at 10 million vehicles. In 2022, Michigan, Indiana, and Kentucky have had the greatest estimated lost production due to semiconductor shortages. Mississippi, Illinois, Indiana, Kentucky, and Tennessee are also among the states that have been hit the hardest.

Fortunately, solutions exist. For example, the *CHIPS for America Act* would create more resilient supply chains, thereby reducing our dependence on foreign nations for auto-grade semiconductors. Failure to pass this legislation would be detrimental to our long-term national security and economy. We must focus on manufacturing mature semiconductor technologies in the United States. The *CHIPS for America Act* will not fix the shortage overnight, but it would go a long way towards ensuring we do not have future shortages.

Appendix II

ADDITIONAL MATERIAL FOR THE RECORD

LETTER SUBMITTED BY REPRESENTATIVE HALEY STEVENS



May 18, 2022

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The Honorable Haley Stevens
Chair
Subcommittee on Research and Technology
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

The Honorable Randy Feenstra
Ranking Member
Subcommittee on Research and Technology
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Chairwoman Stevens and Representative Feenstra,

Canton Township, Michigan's 9th largest municipality, strongly supports the "Building a Workforce to Navigate the Electric Vehicle Future" initiative. This is imperative to not only creating and keeping jobs here, but also in reducing pollution and turning around climate change. We have seen communities across the country turn investments in clean infrastructure into economic development and new jobs. We need Representative Haley Stevens and the rest of our leaders in Washington to go beyond the bipartisan infrastructure bill and build a workforce to navigate the Electric Vehicle future.

Before I became Supervisor, I was an automotive engineer and worked as a sustainability engineer with Ford Motor Company. While in that role, I publicly reported on continual measures to reduce carbon emissions which means reducing pollution from facilities. My work also included the installation and operation of over 600 employee electric vehicle charging stations across the country. Not only did this encourage other Ford employees and residents to purchase electric vehicles, and increase jobs in Electric Vehicle technology, but it pushed to reduce the transportation sectors' carbon footprint – which contributed to a reduction in pollution.

In addition to environmental and climate concerns, Michigan is still experiencing a brain drain – our young people are leaving the state after they graduate. It is imperative that we increase technology training and infrastructure in Michigan. This not only creates jobs, but it keeps jobs here - it keeps our youth here. The investment in infrastructure creates millions of manufacturing, technology and construction jobs. Keeping jobs and technology here in Michigan helps our residents far into the future.

In Michigan, the automotive companies have publicly announced their intentions to go to all electric vehicle production between 2030 and 2050 and we have to be prepared to take our residents into that future quickly.



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Trustees

Governor Whitmer has announced a pledge to make Michigan carbon-neutral by 2050 – and every municipality, every resident, every business and educational organization, has to do their part.

Canton is dedicated to becoming part of the solution to a cleaner environment. We have had over 300 permit requests for personal EV chargers in homes, and estimate more have already been installed. Currently, Canton's municipal organization has 7 hybrid electric vehicles – with more on the way, and are placing electric vehicle chargers at our municipal facilities for our residents. We are currently working with a SEMCOG grant for placement of those municipal chargers. Workers are needed to maintain and install chargers, and must be educated to keep up with the demand.

We again thank Congresswoman Haley Stevens for continuing to support clean energy growth and investments in the electric vehicle market which will improve public health, economic opportunity and 'drive' our residents into the future together.

Sincerely,

A handwritten signature in black ink that reads "Anne Marie Graham-Hudak".

Anne Marie Graham-Hudak
Supervisor

LETTER SUBMITTED BY MR. MARCO A. GIAMBERARDINO,
NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION



May 20, 2022

Haley Stevens, Chairman
House Science, Space, and Technology
Subcommittee on Research and
Technology
2321 Rayburn House Office Building
Washington, DC 20515

Randy Feenstra, Ranking Member
House Science, Space, and Technology
Subcommittee on Research and
Technology
1440 Longworth House Office Building
Washington, DC 20515

Dear Chairwoman Stevens and Ranking Member Feenstra,

The National Electrical Contractors Association (NECA) is a National Trade Association and the leading voice of the \$202 billion electrical contracting industry that brings power, light, and communication technology to buildings and communities across our nation. NECA collectively represents over 4,000 electrical contractor members served by 118 local Chapters across the country.

NECA has long supported the push for bipartisan legislation that provides the investment and resources to help rebuild and modernize our nation's infrastructure. NECA thanks President Biden, the Senate, and the House of Representatives for taking these steps to make the *Infrastructure Investment and Jobs Act (IIJA)* law and applauds the hard work of both chambers of Congress to come together and pass this historical infrastructure legislation. This law will create new job opportunities for our contractors and ensure our nation's economic competitiveness.

The IIJA will invest \$7.5 billion to build out a national network of EV chargers from coast to coast across America. This critical step in President Biden's infrastructure plan strategy will create good U.S. manufacturing and construction jobs for years to come. The legislation will provide funding for the deployment of EV chargers along highway corridors to facilitate long-distance travel and within communities to provide convenient charging where people live, work, and shop. This investment will support the President's goal of building a nationwide network of 500,000 EV chargers. These projects offer the opportunity for a wave of new, good-paying, prevailing wage jobs constructed by our highly skilled and qualified electrical contractors. NECA is here to assist in the safe, sound, and successful growth of the EV market.

NECA employers, both small businesses and major corporations, contribute approximately \$300 million annually to our apprenticeship and training funds across the country that our chapters jointly sponsor with the International Brotherhood of Electrical Workers ("IBEW"). NECA is proud of its commitment to training its members' employees and to building the most successful and well-regarded training programs in the world. For nearly 80 years, NECA employers contributed billions of dollars to apprenticeship funds in the electrical industry to ensure we have the highest skilled workforce in the industry.



NECA has long supported the development and deployment of EV infrastructure for electric vehicles, and our contractors have led the industry in innovation when it comes to this technology. As the Department of Transportation looks to implement IIJA, it is pivotal to ensure we meet quality labor standards for installing, maintaining, and repairing the EV charging stations. Without the equipment to recharge electric vehicles in businesses, our highways, public locations, and residences, our country's goal to lower emissions and support clean energy transportation will never become a reality.

Beyond any other stakeholder in the electric vehicle market, NECA contractors have the technical expertise, workforce, customer service, and integration skills to create a safe and accessible vehicle charging network from the ground up. We are the recognized experts in all forms of electrical installations, equipment permitting, and acquisition. We also partner with manufacturers and distributors throughout the industry to get the right equipment for the job. In addition, NECA led in the development of the only American National Standards Institute-approved *National Electrical Installation StandardSM for Installing Electric Vehicle Supply Equipment* (NECA 413-2019). This standard provides installers with the proper guidance to install EV charging stations and customers with the highest level of quality workmanship and protection.

NECA's enthusiasm and commitment to this emerging market are demonstrated by our support for and implementation of a robust support system for electric vehicles. Our national network of chapters, contractors, workers, and training facilities ensures that we are prepared to take charge of implementing our nation's electric vehicle infrastructure. NECA is an active participant in the Electric Vehicle Infrastructure Training Program (EVITP), a coalition of electric vehicle manufacturers, charging station developers, and service providers who have come together to ensure a ready force of trained electricians and electrical contractors familiar with the unique characteristics of electric technology.

NECA is looking forward to working with the House Science, Space, and Technology and the members of the committee to continue to advance EV charging infrastructure and EVITP.

Sincerely,

Marco A. Giamberardino, MPA
Vice President, Government and Public Affairs

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