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Electric Vehicles Should Be a Win for American Workers

How Federal Policies To Expand Electric Vehicle Production Can Ensure a Good Jobs Future for the United States

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Introduction and summary

The global auto manufacturing industry is undergoing a rapid transition from reliance on internal combustion engines (ICEs) to battery electric vehicles (EVs). This shift is essential for cutting greenhouse gas emissions in order to avoid the most catastrophic impacts of climate change and presents a major opportunity for the U.S. auto manufacturing industry. However, U.S. public and private sector investment in EVs lags behind that of other countries, especially China, threatening both the United States' ability to reach climate goals and the long-term competitiveness of the domestic auto industry, which has long been a source of high-quality, unionized jobs that support a strong middle class. Federal policymakers must invest in EVs and charging infrastructure now in order to support good domestic jobs and cut emissions in the long term. If done right, federal policy can help mitigate the climate crisis, deliver a win for American workers, and ensure national competitiveness in key areas of economic growth, decarbonization, and technological innovation.

This report seeks to square the dual priorities of addressing climate change and supporting the growth of good jobs in a dynamic industry subject to competitive pressures. It describes what is at stake for workers and the economy if the United States does not ramp up domestic EV production. The authors also outline federal policies to meet clean energy goals and create high-quality, good-paying jobs in the United States across the EV value chain and in complementary infrastructure development. This report is part of a forthcoming series of work outlining policies to ensure that clean energy jobs in various sectors of the economy incorporate quality labor standards.

The United States needs to build competitive domestic supply chains in industries that are at the frontier of technological change. The transition to EVs is already underway globally, and decisions made today will determine where and how EVs, batteries, and charging infrastructure are built. International competitors, including China and countries in the European Union, are leading the buildout of EV production for their domestic markets and have signaled their interest in expanding sales worldwide and into the U.S. auto market.[1] Chinese production accounted for nearly half of global EV sales in 2018[2] and more than half of global lithium battery cell manufacturing capacity.[3] If U.S. production—which accounted for less than 20 percent of global EV sales in 2018[4]—

remains slow in the face of this competition, it could lock in a reliance on imported vehicles and components, particularly batteries, for decades to come. The federal government should support American workers by making rapid investments in expanding domestic EV and components manufacturing.

Accelerating the production of EVs, parts, and related technology in the United States must also be matched by efforts to spur consumer adoption of EVs. This should include consumer purchase incentives—which will boost total automotive production levels—as well as major investments in a nationwide network of EV charging infrastructure. Such policies will create new jobs in manufacturing, installation, maintenance, and operations.

Today, the U.S. market for EVs is largely limited to consumers in urban markets, affluent individuals who can afford private charging stations, and areas where state and local governments have invested in EV charging infrastructure.[5] Significant expansion of EV usage across all cities and rural markets, households and workplaces, and for purposes of long-range travel or the long-distance movement of goods, including trucking, remains out of reach due to insufficient federal infrastructure investment. Every community deserves access to charging infrastructure; the public health benefits of a zero-emission transportation system; and the job opportunities that building EV infrastructure, components, and vehicles will create.

All federal support for industry and charging infrastructure growth should require private sector recipients to invest in domestic jobs and consistently apply job quality standards for all workers in these sectors. 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.[6] 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.[7] Without the support of unions to monitor and bargain over workplace conditions, temporary workers are more vulnerable to health and safety concerns.[8]

Construction workers, who will build out the nation's EV infrastructure, face a similar bifurcation of job quality. Unionized construction workers enjoy access to registered apprenticeship programs with career pathways that lead to high wages and benefits, while nonunion workers tend to receive less training and are at greater risk of workplace injury.[9]

Although unionized workers have won tools to address workplace discrimination and pay equity, discrimination remains a serious concern for far too many workers.[10] While automotive manufacturing is more representative of Black workers than are other parts of the manufacturing sector, other workers of color and female workers remain underrepresented in motor vehicle manufacturing and the manufacturing sector as a whole.[11] Any federal policies to accelerate domestic EV manufacturing and charging infrastructure deployment must be structured to support high-quality jobs in fair and safe workplaces that are accessible to Americans from all walks of life.

As the U.S. economy struggles to recover from the COVID-19 pandemic, policies to accelerate investment in EVs and support high-quality American jobs are all the more important. Without government interventions to spur consumer demand for EVs, high unemployment rates and low gas prices could skew the short-term calculus on whether to buy an EV or invest in new manufacturing capacity.[12] Smart federal investments will also ensure that the United States meets climate goals and can compete in the global economy. By supporting high-quality domestic jobs, policymakers can ensure that workers earn decent wages and help jump-start growth in other sectors by spending their earnings in their communities. Establishing stronger workplace standards could also help mitigate unsafe conditions in reopening manufacturing facilities and narrow the long-standing health, environmental, and economic disparities felt by Black and Latinx workers that exacerbate the impacts of the coronavirus crisis and leave the American economy weak.

The authors recommend that policymakers adopt a consistent definition of what constitutes a good clean energy job, including standards to ensure that all workers in the industry earn fair wages and high-quality benefits, can access these jobs no matter who they are or where they come from, and have a fair shot at joining a union and bargaining collectively. The report also proposes standards to strengthen domestic production, including the acquisition of raw materials, component production, and final assembly. In order to make these protections real, policymakers should attach these labor standards to government investments to boost consumer demand for EVs; spur manufacturers to invest in domestic EVs and critical EV components, such as battery production; and build a nationwide network of electric charging stations. In addition to the policies detailed in this report, future trade negotiations can help protect against offshoring by expanding and strengthening U.S. domestic content requirements while also strengthening global supply chains and raising minimum environmental and labor standards for critical materials worldwide.

Supporting the transformation and competitive edge of the automotive industry in a way that promotes high-quality American jobs and keeps global warming to 1.5 degrees Celsius will require a comprehensive plan that draws on a wide range of policies. By combining strong job quality and domestic content standards with major investments in EVs, charging infrastructure, and manufacturing capacity, it will be possible to build broad support for progressive policies.

The authors hope that the recommendations in this report provide concrete solutions for federal policymakers, worker advocates, climate activists, and forward-thinking industry leaders seeking to move the United States toward a 100 percent clean future. If done right, these investments will strengthen and expand pathways into the middle class for Americans from all walks of life while also promising clean air, healthy communities, and a stable climate.

Part I: The global trend toward electric vehicles

The United States must invest in EVs now in order to reduce greenhouse gas emissions and support a strong domestic auto sector in the future. However, the United States currently lags behind its international competitors when it comes to EV manufacturing. Part I of this report explains global EV market trends and domestic EV market performance and addresses considerations for creating a full, domestic EV supply chain.

A global climate imperative: Net-zero emissions by 2050

The Intergovernmental Panel on Climate Change has made it clear that achieving net-zero greenhouse gas emissions globally by 2050 is essential to stabilizing global temperatures at 1.5 degrees Celsius above preindustrial levels and reducing the devastating health and economic impacts of the climate crisis.[13] Transportation is now the highest source of greenhouse gas emissions in the United States, accounting for 29 percent of U.S. emissions.[14] Globally, transportation comprises about 14 percent of total greenhouse gas emissions, not including the industrial emissions from fuel production.[15] Reaching net-zero emissions by 2050 will require transitioning the entire U.S. vehicle fleet from ICE vehicles to EVs or other zero-emission vehicles.[16]

Global vehicle market trends

According to the U.S. Department of Energy, more than 244,000 EVs were sold in the United States in 2019. EV sales in the United States more than doubled from 2017 to 2018, driven in part by federal tax incentives and the introduction of the Tesla Model 3.[17] Meanwhile, sales only grew one-quarter of a percent from 2018 to 2019, reflecting the ramping down of federal EV incentives.[18]

Even with no changes in domestic policy, a rapid shift toward electric propulsion is already underway in the global auto manufacturing industry. EV sales are projected to grow worldwide over the next decade, while passenger ICE vehicle sales have already peaked and are expected to continue to fall.[19] Despite a 19 percent drop in EV sales

from 2019 levels in 2020, the price of EVs and ICE vehicles is expected to converge by the mid-2020s, which is estimated to bring annual passenger EV sales to 8.5 million in 2025, 26 million in 2030, and 54 million by 2040.[20] By 2040, 58 percent of all passenger vehicle sales and more than 30 percent of the global passenger vehicle fleet are projected to be electric.[21] This global transition is already underway and needs to be accelerated worldwide even further. The competitiveness of U.S. auto manufacturing in domestic and global markets will therefore increasingly depend on leadership on EVs.

The 2020 sales outlook for the vehicles sector has shifted dramatically due to the COVID-19 pandemic. While the longer-term trend toward electric vehicles has not changed, the pandemic is projected to have a major impact on global vehicle sales in the near term, regardless of drivetrain, with analysts predicting a 22 percent drop in global vehicle sales.[22] When the most urgent phase of the crisis passes, federal policymakers will face greater urgency to enact policies ensuring that American autoworkers can recover and that the U.S. auto industry remains competitive in the global marketplace. The United States was already falling behind in capturing demand for domestically produced EVs before the start of the pandemic. Enacting deliberate, proactive policies to drive American competitiveness and manufacturing is now even more imperative.

U.S. manufacturing is falling behind that of China and the European Union

Despite the huge market opportunity and favorable global trends, the United States is well behind global competitors in both EV assembly and EV components production. China and the EU are far more advanced than the United States in the EV manufacturing sector due to proactive government policies and investments focused on building their domestic EV supply chain and markets.[23]

China leads the world in total EV production and sales. In 2018, 45 percent of global EVs were built and sold in China.[24] This is not just due to market forces; it is the result of deliberate, focused policy and targeted subsidies by the Chinese government, which spent nearly $60 billion from 2009 to 2017 on its EV manufacturing industry.[25] In 2015 alone, the government invested $8.4 billion in EV incentives and subsidies for consumers—compared with U.S. spending of $2 billion on EV tax incentives from 2010 to 2019—and has taken steps to limit new national ICE vehicle production.[26] Manufacturers are paying attention, with most international automakers establishing EV production in and orienting supply chains toward China. As a result of these extensive subsidies and the aggressive development of new supply chains, China already builds 60 percent of passenger EVs and is expected to produce 65 percent of global lithium-ion batteries by 2021.[27]

The EU has also implemented various policies to capture the global EV market. Europe accounted for 24 percent of the global EV fleet in 2018,[28] and the EU passed a mandate requiring zero- and low-emission vehicles to comprise 15 percent of automakers' sales by 2025, increasing to 35 percent from 2030 onward.[29] The EU and individual European countries have also taken specific actions to capture a meaningful share of the battery manufacturing supply chain, with the EU establishing the European Battery Alliance to create a "complete value chain" for batteries in Europe.[30] Germany has committed $1.1 billion to fund EU battery production.[31] France has developed an $800 million action plan to support the battery value chain.[32] Norway is the global leader in terms of EV market share, with EVs making up 46 percent of the country's vehicle fleet in 2018; the next-largest national markets were the Netherlands at 6 percent, Sweden at 3 percent, and France at 1.5 percent.[33] Norway set national goals for vehicle electrification to ensure that 100 percent of light-duty vehicles, 75 percent of buses, 50 percent of trucks, and 100 percent of new heavy-duty commercial vehicles are zero-emission by 2030.[34]

These trends and the actions of other countries have major implications for workers in the U.S. automotive industry. Unless supply chains for EVs and batteries are developed domestically, the United States risks ceding the competition to China, repeating a pattern recently seen in the case of solar panel manufacturing.[35] Proactive policy will be required for the United States to catch up to its competitors and ensure that the global transition to EVs is a win for American workers.

Creating a complete EV supply chain also requires securing critical minerals—such as lithium and cobalt—that are key components in EV lithium-ion batteries. Clean technology deployment has led to a rapid increase in demand for lithium,[36] with battery production constituting roughly 65 percent of the global demand for lithium.[37] The vast majority of these minerals are mined internationally, sometimes under problematic labor and environmental conditions.[38] The majority of global lithium production occurs in Australia, but more than 90 percent of lithium imports to the United States come from Argentina and Chile.[39] China is rapidly gaining control of global lithium supplies: It now controls more than half of global lithium production and has invested $4.2 billion in South American lithium mining operations since 2017.[40]

Cobalt often has a complicated and difficult-to-trace supply chain. More than half of cobalt originates in Congo, often from mines with troubling child labor and human rights records.[41] The United States should confront these human rights abuses as a matter of policy while also supporting efforts to reduce the amount of cobalt needed in batteries.[42]

To ensure an integrated EV supply chain as battery production expands, the United States must develop a comprehensive strategy to responsibly mine and recycle critical minerals. The BlueGreen Alliance, a coalition of U.S. labor unions and environmental organizations, has called for minimum international environmental and labor standards for critical minerals mining; incentives for the use of responsibly produced materials; investment in projects to recycle materials and create a circular economy; a research and development program to find alternative battery technology that does not rely on such a narrow set of critical materials; and funding for remediation and economic development in communities that have hosted mining and industrial processes.[43] Significant environmental protections and meaningful enforcement must be put in place around industrial facilities supplying and recycling critical materials, and the United States should develop a strategy for securing its supply chains independent of China.

Part II: The state of the U.S. auto manufacturing workforce and the need for policy intervention

The rise of EVs could have significant implications for the U.S. automobile industry, which supports millions of middle-class jobs. Part II of this report examines the state of the current auto manufacturing workforce as well as related EV employment. Policy interventions will be critical to ensure that the shift to EVs bolsters U.S. employment and further improves long-standing job quality standards.

Maintaining U.S. employment

Millions of middle-income American workers are employed in the production, sale, and support of vehicles. As industry technology shifts, the federal government can play an important role in maintaining consistent industry employment levels, supporting employment growth in the provision of essential EV infrastructure, and ensuring that future EV jobs are good jobs.

The automobile industry is a significant player in the U.S. labor force, employing almost 3 million Americans in auto dealerships and manufacturing.[44] Almost 1 million Americans work in motor vehicle and motor vehicle components manufacturing alone,[45] with roughly three-quarters of autoworkers employed in auto parts and one-quarter working in assembly.[46] Hundreds of thousands more Americans work in key supplier industries such as steel and aluminum.[47] The auto industry has grown steadily since the Great Recession,[48] bringing back almost 340,000 manufacturing jobs since mid-2009 while also rapidly reducing vehicle emissions, improving fuel economy, and transforming industry competitiveness.[49] However, the COVID-19 crisis could threaten that trend, with auto manufacturing employment down by more than 30 percent in May 2020 compared with May 2019.[50]

While traditional ICE vehicles continue to make up the bulk of industry production, a growing share of the auto sector works in EV technology.[51] Moving forward, the industry will likely create new jobs for manufacturing new component parts—such as batteries, electric motors, and power electronics—and rapidly building out new charging infrastructure.[52]

In 2019, the U.S. Energy and Employment Report estimated that there were more than 250,000 American workers employed in the manufacture, sale, repair and maintenance of electric, hybrid, and hydrogen fuel-cell vehicles.[53] BlueGreen Alliance looked at manufacturing jobs alone and found that there were 69,000 U.S. workers at more than 200 manufacturing facilities across the United States building components and technology for hybrid and electric cars, SUVs, and pick-up trucks.[54] Much of the employment for EVs and EV components is clustered in traditional manufacturing centers in the Midwest and Southeast, as well as in California and Texas.[55]

The shift toward EV technology will also require a massive buildout of EV charging infrastructure, which will have largely positive jobs impacts. Charging infrastructure deployment supports and accelerates EV sales, and visible public and workplace charging provides range confidence to future EV buyers. For example, a regional survey of consumers in the Northeast found that the likelihood of considering an EV increases by 80 percent if there are increased numbers of visible charging areas, and 83 percent of respondents cited that there are not enough charging stations currently available.[56]

The effect of charging infrastructure on new EV sales has been estimated at 9 percent, suggesting that early investments in EV charging infrastructure are a necessary first step in the transition to vehicle electrification.[57] In addition to building out charging infrastructure in cities, complementary public charging infrastructure is needed along travel corridors and in rural areas to enable the shift toward zero-emission long-distance trips and shipping. The requirements for charging infrastructure vary by jurisdiction, and a national network is required to ensure a full transition to EVs. Having areas of the country without EV infrastructure poses a real and psychological barrier to widespread adoption.

Over the next decade, the United States will need to dramatically increase the installation of new public, private, and workplace charging stations as well as direct current fast chargers in order to address the electricity demand that will result from moving toward a 100 percent clean vehicle fleet by midcentury. Electrification of the vehicle fleet would be the primary driver of an estimated 38 percent increase in U.S. electricity demand by 2050, according to a 2018 analysis by the U.S. Department of Energy,[58] which will require major expansion and modernization of the nation's electric grid—

another source of job creation. Expanding the grid will require the involvement of urban and regional planners, electric power line installers and repairers, and electricians.[59] Moreover, encouraging the domestic production of EV charging equipment can further enhance jobs benefits in infrastructure deployment.

Yet without policy intervention, the shift to EVs also has the potential to significantly disrupt employment in the U.S. auto industry, affecting workers employed in passenger, commercial, and transit vehicle assembly; parts production; maintenance; and other related industries.

With fewer parts and lower mechanical complexity in their propulsion systems, EVs will significantly erode employment in the production of engines, transmissions, exhaust, and conventional fuel systems.[60] For example, Ford estimates that simplification in the assembly of EVs could lead to a 50 percent reduction in capital investments and a 30 percent reduction in labor hours compared with ICE manufacturing.[61] As a result, the EV transition may result in fewer U.S manufacturing jobs as employment shifts from the production of ICEs to electric powertrains.

However, this decline could be significantly offset by growth in electric powertrains and advanced technology components that create new jobs in producing batteries, electric motors, electronics, thermal systems, braking systems, and semiconductors. Components and materials that will continue to be manufactured for EVs must also be prioritized. For example, the steel, tire, flat glass, seating, and aluminum industries are all key auto suppliers that support hundreds of thousands of good jobs.[62]

Yet the question of how much domestic labor will go into new EVs depends heavily on whether the United States can increase the portion of EV content produced domestically, especially EV batteries and lithium-ion cells. Just as the engine and transmission are at the heart of a conventional vehicle's performance and value, so too is the electric propulsion system—the battery, motor, and control system—in an EV.[63] Batteries can comprise 25 to 30 percent of the overall value of the parts in an EV.[64]

Unfortunately, the United States is lagging behind its global competitors in battery production. While several EV manufacturers use domestically assembled battery packs,[65] the components—notably, the lithium-ion cells—used in current EV technology battery packs are typically imported.[66] For example, of the 10 EV models that accounted for 94 percent of 2017 U.S. EV sales, seven used domestically assembled battery packs, but only four used battery cells produced in the United States.[67] The U.S. International Trade Commission estimates that only 26 percent of the total cost of batteries used in EVs sold domestically, including raw materials, originates in the United States.[68]

While Tesla and other manufacturers are beginning to invest in domestic battery cell production,[69] massive additional investments in battery cell production are still needed in order to ensure that an EV expansion creates jobs in the United States.

Indeed, this technological change comes as employment in the auto sector has been undermined overall through growing shifts in component production outside of the United States. Today, automakers and suppliers are making critical investment and location decisions about the next generation of vehicle and components manufacturing. For example, a 2018 report found that aggressive action to attract and locate EV component suppliers to Ohio—a hub of engines and transmissions manufacturing—could support job and economic growth in the state, but a failure to act could result in the loss of roughly 7,000 jobs.[70]

The combination of market trends and potential disruption for American workers points to the need for proactive policies to ensure that the EV transition creates good jobs in the U.S. manufacturing industry.

Upholding job quality standards

In addition to ensuring that future EV jobs are created domestically, policies to drive the EV transition must also support high-quality jobs. Historically, high unionization rates and strong federal policy helped ensure that autoworkers were squarely middle class and established high standards across the major sectors of the American workforce.

Today, average wage rates in the auto industry tend to be higher than national averages, at more than $24 per hour for workers in motor vehicle and parts manufacturing.[71] Yet industry averages mask a growing divide: While unionized, full-time workers earn high wages, benefits, and decent work conditions, nonunion and temporary workers earn far lower wages, receive few benefits, and are more susceptible to injury and discrimination on the job.

For much of the 20th century, high union density and strong collective bargaining agreements allowed manufacturing workers in the automobile industry to earn family-supporting wages and benefits.[72] Notwithstanding pervasive societal racism, jobs in the auto industry opened up a road to middle-class employment for Black workers migrating from the rural South.[73]

Although industry unionization rates have declined in recent years,[74] unions continue to play a major role in maintaining higher-than-average wages in the industry and in shaping job quality. In 2019, roughly 14 percent of employees in motor vehicles and equipment manufacturing belonged to a union—higher than national private workforce averages.[75] These workers can earn upward of $30 per hour and enjoy a suite of high-quality benefits.[76]

At the same time, many of the new auto manufacturing jobs created in the past decade have been nonunion or temporary positions, which come with lower wages and benefits, fewer job protections, and little opportunity for growth.[77] This trend has further exacerbated racial inequality, as Black and Latinx workers are generally overrepresented in temporary staffing work.[78] Since the 1980s, employment in auto manufacturing has shifted from vehicle assembly plants to auto parts suppliers, where wages are significantly lower.[79] In addition, temporary work is increasingly common among automakers, particularly foreign-owned and nonunion automakers, with long-term temporary workers comprising 20 to 25 percent of the labor force.[80] U.S. Census Bureau data show that auto parts workers employed through staffing agencies make almost 30 percent less, on average, than workers who are directly employed by manufacturers,[81] and half of all temporary workers in manufacturing rely on some form of public assistance.[82]

These new work arrangements pose a threat to worker health and safety because temporary workers are less likely to speak up or be able to seek union intervention.[83] Some research suggests that temporary workers are also more likely to suffer injuries on the job.[84] Moreover, without unions, workers have fewer resources to confront issues of harassment and discrimination in the workplace.[85]

Additionally, U.S. wages are far lower than those of other high-wage competitors in the auto industry. For example, the estimated average annual salary for German autoworkers is $69,000 per year, compared with $51,000 in the United States, according to a 2017 industry publication.[86]

The production of new EV components—such as batteries, power electronics, sensors, or semiconductors—has the potential to lower workplace standards by shifting business away from major equipment manufacturers and parts suppliers to new entrants with far lower wages and poor work conditions.[87] For example, Tesla—the manufacturer of the two EV models accounting for nearly half of U.S. sales in 2017[88]—has below-average hourly wages, according to some reports from workers,[89] and has also faced numerous allegations of racial discrimination and labor violations in its facilities.[90]

During the COVID-19 pandemic, the company jeopardized employee safety by fighting state and local stay-at-home orders at its Fremont, California, plant and even threatened to relocate manufacturing to Texas—a state with lower manufacturing and construction wages and fewer worker protections.[91]

To be sure, other firms in the sector have also faced allegations of poor workplace conditions in their plants, including racism and sexual harassment.[92] Furthermore, many foreign-owned auto manufacturers locate their production in the South, where workers' wages are lower and union organizing rights are weaker.[93] Even among traditional auto manufacturers, there is evidence that automakers are seeking to provide workers in battery plants with lower wages and fewer benefits.[94]

There is a similar bifurcation of job quality among construction workers, who will be responsible for building the nation's EV infrastructure. A significant portion of the building and construction industry is unionized. Unionized workers in the field enjoy higher wages, better benefits, and access to training opportunities.[95] Union employers have long partnered with workers' organizations through mutually beneficial registered apprenticeship programs, through which employers receive a steady pipeline of highly qualified workers who meet standards for safety and training.[96] For workers, earning an industry-issued, nationally recognized credential through apprenticeship leads not only to high-paying jobs but also to opportunities for career advancement. [97] The average wage for electricians, for example, is almost $30 per hour.[98]

Increasingly, high-road industry groups and worker representatives are focused on ensuring that the existing workforce is ready to take on EV-related work. For example, the Electric Vehicle Infrastructure Training Program (EVITP) has trained approximately 3,000 electricians nationwide to install and maintain EV charging stations.[99] The EVITP curriculum—developed through a partnership among unions, auto manufacturers, utilities, and educational institutions—provides electricians with instruction and hands-on training to install both residential and public charging stations.

Yet industry standards vary greatly across the construction industry, and too many companies pay wages far below industry standards and often flout workplace laws. Misclassification—a practice where low-road contractors misclassify their employees as independent contractors or less-qualified employees who are eligible for a lower rate of pay—is rampant in the industry. For example, one study found that as many as one-third of construction workers have been wrongly classified as independent contractors in Southern states.[100] This form of workplace fraud not only erodes workers' wages but also can exclude them from a host of workplace laws designed to keep employees safe on the job and can undercut career pathways across the industry.

Without strong standards and protections, new federal investments in the EV industry could subsidize low-road companies that offer poor pay and benefits, discriminate, or otherwise harm workers. Conversely, incentivizing high-road workforce practices could create long-term benefits for workers as well as businesses.[101] Federal policymakers can help raise standards in these industries and broaden support for federal incentives to support the EV transition by ensuring that government support for private employers is conditioned on creating middle-class jobs accessible to all.

Existing job quality interventions

For more than a century, U.S. policymakers have attached standards to ensure that companies receiving government support create good jobs in the United States that pay fair wages, provide essential benefits, do not discriminate against their workers, and allow workers a voice on the job. While these types of standards do not typically extend to federal support for clean energy or an EV transition, they provide an important model for future action.

For example, the federal government went further than it ever had during World War II to encourage collective bargaining and enforce discrimination protections among government contractors. As U.S. automakers converted their manufacturing plants to produce military vehicles and munitions, President Franklin D. Roosevelt created the National War Labor Board, which ensured that—in exchange for labor peace—millions of workers joining the war industries were able to exercise their right to become union members.[102]

In addition, the Roosevelt administration's Fair Employment Practices Commission banned racial discrimination in defense-industry contracts.[103] Companies that openly had whites-only employment policies were told that they must integrate or lose their wartime contracts. In the postwar era, pattern bargaining—a collective bargaining strategy in which unions use the contract terms reached in one agreement to demand similar conditions in another bargaining process—enabled many of these standards to spread throughout the auto manufacturing industry.[104]

Today, the federal government continues to employ a suite of policies to ensure that spending on public infrastructure and government contracting supports domestic manufacturing and does not reward private companies that pay poverty wages or violate workers' rights.

Buy America laws and the Buy American Act require that federal purchasing and investments in transportation infrastructure and rolling stock transit source U.S.-made iron and steel and use domestic production and assembly of other manufactured goods.[105] Policymakers are increasingly focused on enforcing and strengthening these laws. For example, Congress has extended domestic content standards to support the purchase or lease of electric and other types of low-emission transit vehicles by state and local government authorities and has increased the domestic content requirement for public transportation rolling stock from 60 percent to 70 percent of components by value with the 2015 Fixing America's Surface Transportation Act.[106] In addition, the U.S. House of Representatives recently passed a number of Buy America reforms aimed at closing loopholes, clarifying waiver reporting requirements, and providing incentives to boost domestic job production.[107] Members of Congress are also increasingly evaluating whether foreign, state-owned, or state-supported companies receiving federal funding meet domestic content requirements or pose national security risks.[108]

In addition, the Davis-Bacon Act and the McNamara-O'Hara Service Contract Act require that workers on federally funded construction and service work are paid prevailing wages and receive benefits that do not undercut local market wages. While prevailing wage standards vary significantly by geography,[109] prevailing wage laws have long ensured that federally supported construction work creates middle-class jobs in areas where unions are strong.

As discussed above, registered apprenticeships—which are validated by the U.S. Department of Labor and state apprenticeship agencies—are an important tool for maintaining high-quality jobs and a qualified workforce in construction and manufacturing.[110] Registered apprenticeships, often structured as labor-management partnerships involving multiple employers, unions, and educational institutions, also help encourage employer investment in training by alleviating fears that doing so will result in workers being poached. Increasingly, the construction trades and major automakers are pairing apprenticeship and preapprenticeship training to close participation gaps and create pathways for the advancement of women, people of color, and veterans.[111] For example, United Auto Workers and Ford recently updated the eligibility requirements of its joint apprentice program to expand the diversity of its apprentices.[112]

State and local governments are also expanding use of these programs to ensure that women and people of color are able to access high-quality jobs. These policies include requiring publicly supported construction projects to meet apprenticeship utilization and targeted hiring goals; adopting U.S employment plans to encourage bidders for rolling stock procurement contracts to pay decent wages; and providing apprenticeships to and recruiting traditionally underrepresented workers.[113]

The federal government also upholds equal opportunity and prevents discrimination against people of color, women, Americans with disabilities, veterans, and LGBTQ workers through the Office of Federal Contract Compliance Programs (OFCCP); mandates paid leave and higher minimum wages for government contractors; and allows workers to form unions through policies that ensure workers understand their bargaining rights and bar contractors from using federal funding to fight workers' organizing efforts.[114]

Research shows that these types of standards boost wages, reduce inequality, and increase hiring equity.[115] For example, research shows that the OFCCP, through its ability to require affirmative action plans and withhold future contracts, significantly increased opportunity for women and people of color during the 1960s and 1970s.[116] Numerous evaluations of state prevailing wage requirements have shown that these laws raise incomes and reduce income gaps between white and African American workers, among other beneficial impacts.[117] Moreover, research demonstrates that strengthening domestic content rules enhances the U.S. job creation potential of investments.[118]

Policymakers are building off of these models to ensure that federal interventions to support clean energy also help create good domestic jobs. While existing supports for EVs—such as the federal electric vehicle tax credit—lack labor standards,[119] several lawmakers have introduced proposals to attach job quality strings to future funding and spur domestic production of clean vehicles and technology. For example, the Moving Forward Act recently passed by the House makes significant new investments in EV infrastructure and manufacturing capacity, attaches Davis-Bacon wage standards to these investments, and strengthens guidelines to ensure that Buy America protections are enforced.[120]

In addition, Senate Minority Leader Chuck Schumer (D-NY) announced a Clean Cars for America plan in October 2019, which includes consumer vouchers that vary depending on whether the vehicle manufacturer adhered to labor and domestic content standards; incentives for domestically made charging equipment; and incentives to create an American-made manufacturing supply chain for EVs.[121] In the past year, other congressional lawmakers, including Rep. Jackie Speier (D-CA) and Reps. Andrew Levin (D-MI) and Alexandria Ocasio-Cortez (D-NY), have also put forward proposals to address job quality and manufacturing in the EV sector.[122] Moreover, the Good Jobs for 21st Century Energy Act incentivizes a number of high-road labor standards for clean energy manufacturing and energy efficiency

projects that could be adapted to the EV context.[123] Lawmakers in large EV markets such as California continue to debate measures to ensure that policies to expand EV production and deploy cleaner vehicles also boost labor standards across the industry and improve outcomes for working people across climate-related spending.[124]

These proposals are an encouraging start. However, no proposal is fully comprehensive, and advocates have not yet converged on a consistent approach to ensure good jobs in the EV sector.

Part III: Policy recommendations

In order to reduce greenhouse gas emissions and support American jobs and competitiveness, U.S. policymakers must adopt a comprehensive strategy to transition to EVs. Part III of this report provides concrete recommendations on how to structure federal interventions to spur sufficient private sector EV investments and ensure that they create good clean energy jobs in the United States. These recommendations will also help broaden the coalition advancing these reforms.

Principles for high-quality, domestic jobs in the EV sector

In order to ensure that all EV-related jobs—including those in manufacturing, construction, and maintenance—are good jobs, federal support for EVs should include requirements for quality wages, benefits, worker protections, and domestic content. Congress should include the following job quality standards on all federal support for EVs, including consumer incentives for U.S.-produced EVs; direct support for domestic manufacturers; investments in public sector infrastructure; direct government purchase of EVs; and any other type of contract, grant, loan, loan guarantee, or tax credit to support the industry:

- **Guarantee family-supporting wages and benefits.** All companies that receive subsidies to support EV manufacturing, infrastructure, and maintenance should be required to provide all workers—including temporary workers—with family-supporting wages, health and welfare benefits or cash equivalents, and at least seven days of paid sick leave. Family-supporting wages should be defined as existing market wages—such as those the government currently sets through prevailing wage laws for several sectors—with a high floor to ensure that no one is paid poverty wages.[125] Companies receiving government support would also be required to maintain fair overtime and scheduling practices.

- **Prohibit discrimination.** Any private company receiving federal funds should be barred from discriminating and retaliating against workers based on race and ethnicity, religion, sex, sexual orientation, gender identity, national origin, disability, or veteran status. The OFCCP, with its power to withhold future support and require affirmative action plans, would enforce these protections. While OFCCP oversight currently extends only to federal contracting funds, Congress should expand its oversight to all federal support for EVs.

- **Respect workers' right to join a union and bargain collectively.** All federal support for EVs should protect and promote high-quality union jobs. To ensure that workers have a fair shot at forming a union, recipients of federal EV funding should be required to respect workers' right to organize. For example, companies receiving subsidies should be required to support workers' ability to communicate with each other about collective issues and be prohibited from forcing workers to attend mandatory meetings aimed at dissuading them from joining a union, as is mandated in the Protecting the Right to Organize Act. They should also be required to maintain neutrality or labor peace if there is a risk of disruption.[126] Finally, policymakers should prohibit employers from using forced arbitration agreements that eliminate employee rights.

- **Comply with safety standards and other workplace laws.** As the United States recovers from the ongoing economic and health consequences of the coronavirus pandemic, policymakers must ensure that all recipients of federal funds keep employees safe on the job and comply with the full range of existing labor and employment laws. Without ongoing oversight to ensure legal compliance, low-road employers may not take the necessary safety precautions to keep assembly-line workers safe on the job, and workers may fear that their employers will fire or otherwise illegally retaliate against them for reporting violations. In order to raise standards in the EV industry, workers need to know their rights and feel comfortable coming forward to report legal violations, including violations of workplace safety and health laws, collective bargaining and discrimination protections, and wage standards. This can be accomplished through enhanced government monitoring of companies receiving subsidies as well as through partnerships with unions to provide know-your-rights training and outreach to workers.[127]

- **Create jobs in the United States.** The federal government should significantly expand its use of financial incentives to support new advanced manufacturing facilities in the United States—prioritizing both assembly and essential components manufacturing—and target consumer incentives to U.S.-built vehicles. In addition, the government must update, strengthen, and improve its capacity to enforce current domestic content standards. This means closing Buy America loopholes;

establishing high thresholds for granting waivers of content requirements for government purchasing; improving transparency so that the government and the public can confirm companies are in compliance;[128] ensuring that low-bid contracting procedures do not undercut the ability to source domestically produced content; and ensuring that all protected goods listed in trade agreements are also covered under Buy America protections. Furthermore, policymakers should extend coverage of these protections to a greater number of spending programs and to more materials, components, and end products to ensure that the federal government is a purchaser of American-made products.

- **Prioritize dislocated and disadvantaged workers.** Policymakers should prioritize investments to benefit the workers and communities that need them most. This could involve retooling existing manufacturing facilities and investing in facilities that are at risk of closure, especially in regions that have experienced declines in manufacturing employment. Where possible, businesses should prioritize hiring workers who have been displaced by the shift to next technology, such as workers who are displaced due to the shift away from the production and servicing of ICEs. In addition, businesses receiving federal support should recruit and hire disadvantaged or underrepresented workers[129]—such as women, people of color, veterans, workers with disabilities, and formerly incarcerated workers—and provide them with advancement opportunities with real career paths.[130]

Broad application of the above job quality principles will ensure that federal funds elevate, rather than erode, high-road standards in the domestic automotive industry.

Applying job quality principles to EV policies

While all federal support for the shift to EVs should evaluate private sector recipients based on the above principles, application of these principles may vary depending on the nature of the jobs affected. In many cases, the federal government has already developed standards that could simply be adapted to EV spending. However, in some instances, the government will also have to develop new job quality standards.

For example, while spending related to the construction or servicing of EV-related infrastructure should be covered by the Davis-Bacon Act and the McNamara-O'Hara Service Contract Act, the federal government also would need to develop a prevailing wage-like standard to cover jobs in auto assembly as well as manufacturing of key component parts.[131] This graduated compensation rate—with wage progression based on skills and job categories—should be determined on a national basis to ensure that companies do not flee high-wage, more unionized areas of the country.[132]

Moreover, it should cover both permanent and temporary workers to disincentivize manufacturers from using temporary work to drive down wages. Indeed, such a nationwide prevailing wage standard would encourage automakers to only use temporary workers for truly temporary work; ensure that companies do not compete on the basis of low labor costs; and encourage long-term investment in the training and development of their workforce.[133]

The U.S. Department of Labor should certify manufacturers as well as companies installing necessary infrastructure based on their demonstrated compliance with the job quality standards listed above. Only companies that demonstrate compliance would be eligible for federal funding. In order to be eligible for these funds, companies with poor records would need to work with the government and workers' organizations to establish a plan for remedial activities and enhanced monitoring. In order to supplement the government's enforcement capacity[134] and ensure that the workers most vulnerable to workplace violations come forward, the federal government should fund unions and other workers' organizations to provide know-your-rights training and outreach to vulnerable workers.[135] The government can also attach certification requirements to a number of policies, including consumer incentives for EVs, manufacturing supports, government procurement, charging infrastructure investments, and worker training programs.

Incentivize consumer EV purchases

Accelerating consumer demand for EVs will require sustained federal incentives beyond the expiration of the existing 30D tax credits—which provide consumers a credit of up to $7,500 for the purchase of qualifying EVs[136]—even if the current phaseout for individual manufacturers is extended from the first 250,000 vehicles per manufacturer to the first 600,000 vehicles, as has been proposed in various bills.[137] Several promising legislative approaches have been proposed, including Rep. Speier's plan to double the size of the tax credit and eliminate the per-manufacturer cap,[138] as well as Sen. Schumer's Clean Cars for America plan to offer cash rebates toward the purchase of an EV if a used gasoline-powered vehicle is traded in and scrapped.[139]

CAP recommends a vehicle trade-in and rebate program to transition the ICE vehicle fleet to EVs. This Cash-In for Clean Cars program, discussed in previous CAP reports,[140] would catalyze both the sale of EVs and the retirement of used gasoline-powered vehicles. Through this program, the federal government would offer a point-of-sale cash rebate toward the purchase of a new, American-made EV if a used gasoline-powered vehicle is retired and scrapped concurrently. CAP will soon release a paper titled "Cash-In for Clean Cars" that models how a $7,500 vehicle trade-in rebate would drive the transition to a zero-emission, light-duty vehicle fleet.

To drive quality jobs in the EV sector and broaden the U.S. manufacturing base, any such program should require that manufacturers certify compliance with job quality and domestic content standards across their EV value chain. Final vehicle assembly and battery assembly should occur in the United States, and policymakers should include a Buy America-like domestic value content standard for EV batteries and other key components and materials. For example, Sen. Schumer's Clean Cars for America plan provides an additional incentive for vehicles with a U.S.-manufactured battery,[141] and Rep. Speier's proposed legislation specifically requires that an EV's battery cell, battery package, battery management system, and battery cooling system be manufactured in the United States to be eligible.[142]

Although some EV manufacturers may not currently meet all of the above standards, federal policy can spur the adoption of higher standards at the same time as it promotes greater EV production and fleet turnover. CAP recommends that an EV incentive should initially offer an additional $2,500 point-of-sale cash rebate for the purchase of EVs that have been certified by the U.S. Department of Labor as upholding strong labor and domestic content standards. However, these additional rebates should be phased out over a period of years and replaced in increments by increasingly strict standards. At the conclusion of the phase-in period, rebates should be available only for vehicles from companies that fully satisfy all new labor and domestic content standards.

While it may take the government a few years to develop a graduated wage standard for component parts and assembly workers, certain standards—such as a minimum wage of $20 per hour and seven days of paid sick leave for all workers, including temporary workers—could be implemented very quickly. A baseline requirement for domestic assembly of vehicles could also take immediate effect. Most other labor and domestic content requirements could reasonably be phased in within five years, which would allow time for analysis and outreach to determine national prevailing pay and benefits for workers across the industry. CAP recommends that policymakers develop similar increments for the phase-in of higher domestic content standards, with an understanding of the time required to adjust supply chains and with a sufficiently large financial incentive to motivate early action.

Spur manufacturers to invest in domestic EV production

In addition to policies that spur consumer demand, targeted government incentives and direct manufacturing supports are needed to retool assembly lines, construct new manufacturing facilities, and develop a domestic EV supply chain, including a complete battery value chain. Because EVs compete based on their batteries,[143]

federal investments in domestic EV battery cell production and assembly will be a crucial driver of U.S. competitiveness and long-term job creation. Policymakers should leverage significant new investments in research and development to accelerate technological advancements in a variety of EV technologies. These investments should include funding for projects to recycle critical minerals as well as research aimed at developing alternative battery technologies.

Among other measures, Congress should reauthorize the 48C Advanced Energy Manufacturing Tax Credit, a 30 percent investment tax credit that was originally authorized under the American Recovery and Reinvestment Act to promote clean energy manufacturing in the United States. The credit, which expired in 2013, should be reauthorized and made refundable; its funding should be at least tripled; and Congress should make explicit that light-duty, medium-duty, and heavy-duty EV manufacturing, battery manufacturing, and charging equipment manufacturing all qualify under the program. Additionally, Congress should expand the U.S. Department of Energy's Advanced Technology Vehicle Manufacturing loan program, which provides loans and loan guarantees to vehicle manufacturers and automotive component manufacturers and was instrumental in helping several manufacturers expand EV production and recover after the Great Recession.[144] Congress should also provide at least $3 billion in funding for the Domestic Manufacturing Conversion Grant Program, which encourages the domestic production and sale of efficient hybrid, plug-in electric, and advanced diesel vehicles and components.[145] Finally, lawmakers should support efforts by the Manufacturing Extension Partnership to build up this new supply chain.[146]

In order to qualify for these supports, companies should be required to demonstrate compliance with the above wage and job quality standards for any worker on construction, alteration, or repair financed in part or whole by federal dollars. In addition, all workers at manufacturing facilities that receive federal support will be covered by these standards for the first 10 years of operations.[147] Moreover, policymakers should take steps to ensure that small and medium-sized manufacturers and businesses owned by women and people of color have an opportunity to take advantage of investment dollars.

Finally, as part of the comprehensive strategy regarding critical materials, the United States should use trade, procurement, and other measures to raise minimum environmental and labor standards for critical materials worldwide and encourage the development of supply chain certification methods, as described in the BlueGreen Alliance's Manufacturing Agenda.[148]

Build EV charging infrastructure

CAP will soon release a report that analyzes the current gaps in EV supply equipment across the United States. The report will present recommendations on the levels of charging infrastructure needed to support the transition to a zero-emission transportation sector and describe how to structure this infrastructure buildout in a way that ensures equity and economic opportunity for all. Expanded EV infrastructure—particularly charging stations—will play a critical role in mass EV adoption. Federal investment through tax incentives and direct grants should support businesses and state and local governments in building, installing, and maintaining residential, workplace, and public charging infrastructure.[149] Different programs will be required to reach different segments of the transportation sector, including at-home charging, public charging for light-duty and medium-duty vehicles, transit agency and school-district charging for buses, and charging along interstate freight routes for heavy-duty trucks.

In particular, federal incentives for EV charging infrastructure must ensure that charging stations are deployed equitably, targeting areas of poor air quality, low-income neighborhoods, rental units, and buildings without access to off-street parking. Access to EV charging infrastructure is especially important for lower-income populations that have less access to at-home or workplace charging stations.[150]

In addition, special attention must be paid to EV infrastructure buildout in underserved rural areas and along interstate travel corridors across the country to ensure access to electric transport for long-distance trips, shipping, and trucking. A federal program can prioritize concerns of equity and geographic dispersion while deploying the required level of new federal investment in zero-emission transportation options for community members in both rural and urban areas. The accessible and affordable adoption of electric cars requires equally accessible and affordable deployment of charging infrastructure.

All federal incentives for electric charging equipment and stations should be contingent on the use of American-made charging equipment, including domestically produced iron and steel, and subject to the quality job standards described above. In addition to the essential job quality standards that all EV investments would carry, funding for the buildout of EV charging infrastructure should require that installation and maintenance work be done by certified workers who are fully qualified to complete the work.[151] As discussed below, the government can also take an active role in supporting the development of these sorts of training and certification programs.[152]

Transition public vehicle fleets to electric

According to the U.S. General Services Administration, the federal government owned or leased more than 640,000 vehicles in 2018, of which roughly 170,000 were military vehicles.[153] CAP recommends transitioning subcompact, compact, and midsize vehicles in the federal fleet to electric versions. Congress should also direct the U.S. General Services Administration to clarify procurement rules for federal agencies to make clear that the purchase or lease of domestically manufactured EVs is required whenever available.

To ensure that these electric vehicles meet quality labor standards, the federal government should require contracting agencies to consult the list of U.S. Department of Labor-certified vehicles. While Buy America waivers in current international trade agreements place some limits on the U.S. General Services Administration's ability to require domestic content in direct government purchases, federal purchasing authorities do not take full advantage of several exceptions to the rules.[154] Domestic content requirements for government procurement could also be strengthened through future trade negotiations or by congressional action. In addition to strengthening domestic content, the government should require companies fulfilling procurement needs to demonstrate compliance with the aforementioned quality job requirements regarding wages and benefits, discrimination, and compliance with health and safety laws.

The federal government can also promote EV transition, job creation, and high-road employment practices through the existing or newly proposed surface transportation programs of the Federal Transit Administration and the Federal Highway Administration.[155] These funds are already covered by Buy America laws,[156] but Congress should review and modernize Buy America standards and domestic content accounting requirements for public transit and rolling stock manufacturing, particularly as they relate to battery electric buses. Currently, ambiguous and inconsistent regulatory standards, permissive accounting, and lax enforcement provide ample pathways for substantial foreign material inputs in Buy America-compliant EV transit vehicles.

Consider the Federal Transit Administration's Buy America requirements as applied to rolling stock transit vehicles: Promulgated decades before the advent of EV buses, the regulation's domestic component content requirements, as currently written, are ill-suited to overcome global market distortions and subsidized foreign competition in a manner that fosters the fledgling U.S. EV bus market. Because batteries make up a significant portion of a vehicle's total cost, the origin of an EV transit vehicle's battery is frequently dispositive of Buy America compliance. However, current battery content

accounting practices may allow manufacturers to overestimate the value of domestic parts and labor[157] by counting battery packs assembled in the United States toward Buy America component thresholds, even if those packs derive significant value from imported battery cells.[158] These definitional gaps, in addition to the lack of official agency guidance, have led to concerns about manufacturers gaming the system.[159]

Policymakers should update Buy America laws to ensure that domestic content thresholds for batteries and their inputs rise, while also keeping in mind the importance of nonbattery domestic content.[160] As policy efforts to invest in and incentivize U.S. battery cell production take hold, officials should recognize variations among original equipment manufacturers when it comes to the content of their component parts.

Furthermore, the government should require that public transit funds go to employers who demonstrate compliance with good jobs principles and require state and local recipients of high levels of funding to use a U.S. Employment Plan. These plans, which were developed by the Jobs to Move America coalition and approved by the U.S. Department of Transportation in 2016, are a customizable tool to encourage companies competing for public rolling stock procurement contracts to disclose information on job creation, job quality, and plans to recruit and train historically marginalized workers. The U.S. Employment Plan model serves as a roadmap for how cities, states, and public agencies could build jobs and equity into their bidding processes.[161] Finally, government authorities should commit to retraining public sector workers to operate and maintain EV buses, rather than contracting out those services.

Workforce training and placement of dislocated and disadvantaged workers

Government policies should include support for workforce retraining and placement in quality jobs for existing workers, as well as for dislocated and disadvantaged workers, including women, people of color, returning citizens, and workers with disabilities. Reemployment and training programs can also be used to structure certifications to ensure that new EV-related opportunities do not de-skill an occupation or erode quality standards for the existing workforce.[162]

While the onus should be on industry to reassign and retrain the incumbent workforce, federal programs should provide unions, employers, and educational institutions with grants for workforce training and allow grant recipients to use funds to pay a portion of employee wages or provide stipends during training. It should also incentivize partnership with the public workforce development system to address common workforce challenges faced by the industry. Promoting deeper coordination with the broader workforce ecosystem will be key to a successful reemployment and training program.[163]

Grants should prioritize labor-management partnerships, registered apprenticeship programs, and apprenticeship readiness programs and require that employers receiving federal funds target dislocated and disadvantaged workers. For example, the Blue Collar and Green Collar Jobs Act of 2019 would direct the U.S. secretary of labor to establish a nationwide training program for energy-related assistance and provide workforce grants to eligible entities such as labor organizations.[164]

Grants should be available to support the training of a wide range of workers affected by an EV transition, including manufacturing workers, vehicle and infrastructure maintenance workers, and oil and gas workers.[165] This funding should also support the retooling and expansion of existing registered apprenticeship programs to support new EV jobs, as well as the development of industry standards to ensure that workers are fully trained and qualified.[166]

Finally, large government-supported infrastructure and manufacturing projects should incorporate preapprenticeship programs, apprenticeship utilization requirements, and targeted hiring requirements to ensure equitable access and improve completion rates for women and people of color, who too often are left out of these programs.[167] For example, the Los Angeles County Metropolitan Transportation Authority adopted a policy in 2012 requiring 20 percent of employees on construction projects to be apprentices and 10 percent to be hired from underserved and underrepresented communities.[168]

Conclusion

With the transportation sector comprising the largest source of U.S. greenhouse gas emissions, vehicle electrification is an essential strategy for achieving science-based emissions reduction targets to prevent the worst impacts of climate change. Investing in this new industry will be critical for maintaining international competitiveness and domestic supply chains.

Federal funding to incentivize consumer demand, drive manufacturer investments, and build out electric vehicle infrastructure should be made contingent on key job quality and domestic content standards. In structuring funding, policymakers must be realistic about present EV capacity while also ensuring that taxpayer dollars do not subsidize low-road employers or erode job quality standards in the broader industry. By designing federal policies that encourage both rapid vehicle electrification and the creation of high-quality, good-paying domestic jobs throughout the EV ecosystem, policymakers can satisfy the priorities of climate and labor advocates and ensure economic prosperity for future generations. In a period of significant economic and environmental challenges, the transition to EVs presents a powerful and positive opportunity to improve conditions for both American workers and the climate.

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130 See figure 3 in BlueGreen Alliance, "Electric Vehicles at a Crossroads."

131 While the U.S. Supreme Court in *Wirtz v. Baldor Electric Co.* struck down provisions in the Walsh-Healey Public Contracts Act of 1936 that allowed the federal government to set prevailing wages in contracted manufacturing industries, the court's decision pertained to how the federal government calculated wage rates, not the government's authority to set wage rates in the industry.

132 For example, Davis-Bacon prevailing wages previously could be set at the wage paid to 30 percent of workers in an industry in that locality. See George Ruben, "Economy improves; bargaining problems persist in 1983," *Monthly Labor Review* (1984), available at https://www.bls.gov/opub/mlr/1984/01/art3full.pdf.

133 For sound practices regarding temporary work, see figure 3 in BlueGreen Alliance, "Electric Vehicles at a Crossroads."

134 Currently, the government does not have sufficient enforcement officers to conduct proactive outreach and enforcement for all vulnerable workers. See, for example, National Employment Law Center, "Winning Wage Justice: An Advocate's Guide to State and City Policies to Fight Wage Theft" (New York: 2011), p. 44, available at https://www.nelp.org/wp-content/uploads/2015/03/Winning-WageJustice2011.pdf.

135 Several cities, including Los Angeles, Seattle, and San Francisco, have had considerable success adopting these types of co-enforcement strategies. See Madland and Wall, "American Ghent."

136 Internal Revenue Service, "Plug-In Electric Drive Vehicle Credit (IRC 30D)," available at https://www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d (accessed June 2020).

137 Driving America Forward Act, S. 1094, 116th Cong., 1st sess. (April 9, 2019), available at https://www.congress.gov/bill/116th-congress/senate-bill/1094; INVEST In America Act [Moving Forward Act], H.R. 2, 116th Cong., 2nd sess. (June 29, 2020), Section 90431, available at https://www.congress.gov/116/meeting/house/110850/documents/BILLS-116HR2-RCP116-54.pdf.

138 Affordable American-made Automobile Act, H.R. 5393, 116th Cong., 1st sess. (December 11, 2019), available at https://www.congress.gov/bill/116th-congress/house-bill/5393?s=1&r=7.

139 Senate Democrats, "Clean Cars for America – Detailed Summary."

140 Podesta and others, "A 100 Percent Clean Future."

141 Senate Democrats, "Clean Cars for America – Detailed Summary."

142 Under Rep. Speier's Affordable American-made Automobile Act, "To qualify for the tax credit, the battery cell, the battery package, the battery management system and the battery cooling system would have to be manufactured in the U.S." See Office of Rep. Jackie Speier, "The Affordable American-made Automobile Act," available at https://speier.house.gov/_cache/files/6/f/6f032d8f-f394-4e00-9d0c-0728898ae1b7/25AFB7D13CE1AE260075709A870C46A9.200131-aaaa-fact-sheet.pdf.

143 Coffin and Horowitz, "The Supply Chain for Electric Vehicle Batteries." Note that the lithium-ion battery cells and battery pack make up nearly two-thirds of EV powertrain costs. See United Auto Workers, "Taking the High Road."

144 Dan West, "Trump Budget Threatens Clean Car Innovation and Our Health," National Resource Defense Council, February 21, 2018, available at https://www.nrdc.org/experts/luke-tonachel/trump-budget-threatens-clean-car-innovation-and-our-health.

145 See Energy Independence and Security Act, H.R. 6, 110th Cong., 1st sess. (January 12, 2007), Section 132, available at https://www.congress.gov/bill/110th-congress/house-bill/6/text.

146 NIST, "Manufacturing Extension Partnership (MEP)," available at https://www.nist.gov/mep/about-nist-mep (last accessed June 2020).

147 Idea adapted from USA Electrify Forward Act, H.R. 5558, 116th Cong., 2nd sess. (January 8, 2020), available at https://www.congress.gov/bill/116th-congress/house-bill/5558.

148 BlueGreen Alliance, "Manufacturing Agenda."

149 As described in Sen. Schumer's Clean Cars for America plan. See Senate Democrats, "Clean Cars for America – Detailed Summary."

150 Ryan Bodanyi, "EV Charging and the Vehicle Purchase Process: Lessons Learned from Rebated Consumers" (San Diego: California Clean Vehicle Rebate Project, 2019), available at https://energycenter.org/sites/default/files/docs/nav/resources/EUEC_2019_EV_Charging_0.pdf.

151 This is similar to Sen. Schumer's Clean Cars for America plan, wherein, "[t]he charging equipment would be installed by certified workers and additional incentives would be given for using domestically made charging equipment." See Senate Democrats, "Clean Cars for America – Detailed Summary."

152 The Electric Vehicle Infrastructure Training Program, for example, is a labor-management partnership that certifies electricians to install electric vehicle supply equipment. See Electric Vehicle Infrastructure Training Program, "Training," available at https://evitp.org/training/ (last accessed June 2020).

153 See U.S. General Services Administration, "Federal Fleet Report" (Washington: 2018), Table 1-1, available at https://www.gsa.gov/policy-regulations/policy/vehicle-management-policy/federal-fleet-report.

154 U.S. procurement is governed by the Buy American Act of 1933, but Buy American provisions tend to be waived in cases where the United States has reciprocal trade agreements, which makes it difficult to require domestic content in U.S. General Services Administration procurements. For example, the World Trade Organization's Agreement on Government Procurement (GPA) specifically aims to subject participating members to governmental procurement market access obligations. Even so, the GPA provides some room for member nations to pursue measures that have a regulatory purpose. For example, Article III of the revised GPA allows countries to take measures "necessary to protect human, animal or plant life or health." See Manuel and others, "Domestic Content Restrictions"; Platzer and Mallet, "Effects of Buy America on Transportation Infrastructure and U.S. Manufacturing"; World Trade Organization, "Revised Agreement on Government Procurement," available at https://www.wto.org/english/docs_e/legal_e/rev-gpr-94_01_e.htm (last accessed July 2020).

155 For example, the Federal Highway Administration's Congestion Mitigation and Air Quality Improvement (CMAQ) Program "provides funds to States for transportation projects designed to reduce traffic congestion and improve air quality, particularly in areas of the country that do not attain national air quality standards." Another program, the Federal Transit Authority's Low or No Emission Vehicle Program, provides grants for state and local authorities to purchase or lease zero-emission and low-emission transit buses and acquire supporting facilities. See U.S. Department of Transportation, "Federal Programs Directory: Congestion Mitigation and Air Quality (CMAQ) Improvement Program," available at https://www.transportation.gov/sustainability/climate/federal-programs-directory-congestion-mitigation-and-air-quality-cmaq (last accessed June 2020); Federal Transit Administration, "Low or No Emission Vehicle Program – 5339(c)," available at https://www.transit.dot.gov/funding/grants/lowno (last accessed March 2020).

156 Specific Buy America provisions vary depending on the program. See Platzer and Mallet, "Effects of Buy America on Transportation Infrastructure and U.S. Manufacturing."

157 See discussion in Scott Paul, "Testimony of Scott N. Paul, President, Alliance for American Manufacturing, Before the U.S. House of Representatives Committee on Transportation and Infrastructure: Hearing on the Impacts of State-Owned Enterprises on Public Transit and Freight Rail Sectors," May 16, 2019, available at https://transportation.house.gov/imo/media/doc/Testimony%20-%20Paul.pdf; Bill Canis and William J. Mallet, "Buy America and the Electric Bus Market" (Washington: Congressional Research Service, 2018), available at https://fas.org/sgp/crs/misc/IF10941.pdf.

158 Canis and Mallet, "Buy America and the Electric Bus Market."

159 See discussion in Scott Paul, "Testimony of Scott N. Paul, President, Alliance for American Manufacturing, Before the U.S. House of Representatives Committee on Transportation and Infrastructure."

160 With batteries accounting for a greater share of overall vehicle costs, it would be easy to only focus on battery production. However, focusing only on battery production could cause harm to other areas of domestic production such as steel. It is important that policymakers focus on investments in both battery production and components manufacturing.

161 Jobs to Move America, "Resources: U.S. Employment Plan," April 10, 2020, available at https://jobstomoveamerica.org/resource/u-s-employment-plan-2/.

162 For example, the Electric Vehicle Infrastructure Training Program trains existing electricians to install and maintain electric vehicle charging stations. See Electric Vehicle Infrastructure Training Program, "EVITP," available at https://evitp.org/ (last accessed June 2020).

163 See, for example, Daniel Weissbein and the Axiom Corporation, "Innovative Transit Workforce Development Projects of 2015: Summative Evaluation" (Washington: Federal Transit Administration, 2020), available at https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/147206/innovative-transit-workforce-development-projects-2015-summative-evaluation-ftareportno0153.pdf.

164 Blue Collar and Green Jobs Act of 2019, H.R. 4061, 116th Cong., 1st sess. (July 25, 2019), available at https://www.congress.gov/bill/116th-congress/house-bill/4061/text.

165 Funding should include training for transit agency maintenance workers in order to ensure that these workers have the opportunity to develop expertise in battery-electric bus maintenance, comparable to their knowledge of traditional buses. Note that there is some concern that the transition to battery-electric buses could lower maintenance needs and put maintenance workers out of their jobs. See Christy Veeder, "Transforming Transit, Realizing Opportunity: How battery-electric buses can benefit the environment, the economy, and public transit" (Los Angeles: Jobs to Move America, 2019), p. 75, available at https://jobstomoveamerica.org/resource/transforming-transit-realizing-opportunity/.

166 Idea adopted from Blue Collar and Green Jobs Act of 2019, H.R. 4061, 116th Cong., 1st sess. (July 25, 2019), available at https://www.congress.gov/bill/116th-congress/house-bill/4061/text.

167 Lam, "Equity-Oriented Workforce Strategies for a Progressive Infrastructure Plan"; Angela Hanks, Annie McGrew, and Daniella Zessoules, "The Apprenticeship Wage and Participation Gap" (Washington: Center for American Progress, 2018), available at https://www.americanprogress.org/issues/economy/reports/2018/07/11/453321/apprenticeship-wage-participation-gap/. For an example of how preapprenticeships can be used to provide access to different demographic groups, see International Brotherhood of Electrical Workers Media Center, "Level the Playing Field: Pre-Apprenticeships Open Doors to the Middle Class," February 12, 2019, available at http://www.ibew.org/media-center/Articles/20Daily/2002/200212_Leveling.

168 Walter, "Infrastructure Investment Must Create Good Jobs for All."

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