



**BLUEGREEN  
ALLIANCE**

# **ELECTRIC VEHICLES AT A CROSSROADS:**

## **Challenges and Opportunities for the Future of U.S. Manufacturing and Jobs**

### **INTRODUCTION**

Electric vehicle innovation, investment, production, and adoption are growing rapidly, both worldwide and in the United States. As part of an overall revival in innovation and investment in the automotive industry, manufacturers are demonstrating that the United States can be a global leader in clean technology manufacturing, while bringing back high-skill, high-wage, family-supporting jobs. Continuing this trajectory in the electric vehicle (EV) sector will be critical to retaining and growing the next generation of American manufacturing and jobs.

The BlueGreen Alliance's ongoing research finds both exciting progress as well as cause for concern.

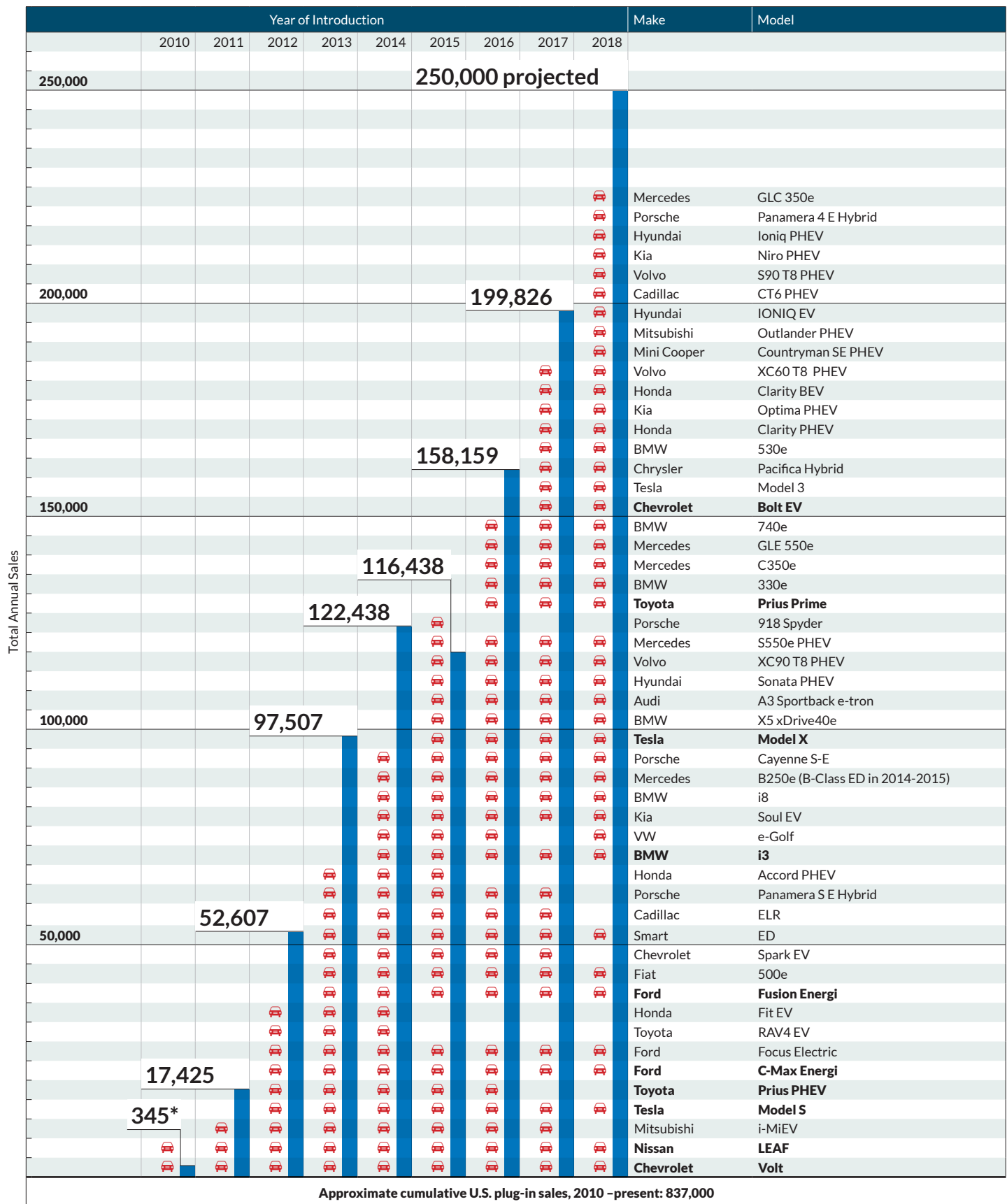
Today, many of the U.S. market-leading EVs are domestically assembled, as are a growing range of key electric powertrain components. At the same time, China, Japan, the European Union (EU), and countries worldwide are investing heavily and creating powerful policy drivers to spur their own leadership in electric vehicle technology and deployment. If the United States falls behind in spurring domestic innovation and investment in EVs and components, U.S.-based original equipment manufacturers (OEMs) and suppliers will be playing catch-up and losing jobs and market share, while the United States risks ceding the next generation of domestic vehicle production and jobs to other countries. Sustaining strong federal and state policy and investment, and maintaining a technology and manufacturing edge, will be critical to staying in the game.

Similarly, while much of the industry supports good jobs and working conditions, even in the highest value-added manufacturing, some advanced conventional and EV manufacturers are shifting towards lower job standards than industry norms. Taken to extremes, low wages, hazardous working conditions, and poor labor-management relations are not only bad for working families and communities, but are inconsistent with retaining appropriately skilled labor and sustaining the high volume, high-quality production necessary to remain competitive over the long term.

More broadly, as the public sees declining wages and working conditions across the economy, it drives public pessimism about the benefits of U.S. technological progress and leadership. This erodes support for new, clean technology and for the policies that support action on clean energy and climate change. With a foundation of some important gains seen to date in the auto sector, there is an opportunity to demonstrate a strong, competitive clean vehicle industry that can continue to support good jobs and prosperity into the future and sustain and build broad support for the policies needed to continue this transition. Decisions made today by companies and policymakers will have a powerful impact on the direction and future success of the industry, and for workers, the public, the environment, and the economy.

As leaders in EV deployment, states have the opportunity to shape their policy in ways that sustain broad public support, shape the emerging industry, and ensure the state sees not only environmental benefits, but economic, worker, and equity benefits from its investments.

### Figure 1: U.S. EV and PHEV Introductions and Sales by Year 2010-2018



**Discontinued electric vehicles sold pre-2010 and not included in list:** General Motors EV1: 1,117 | Fisker Karma: 1,700 | Tesla Roadster: 1,900

**Sales data sources:** General Motors EV1 sales from Jalopnik.com, all other sales data from InsideEVs.com

**\*Note:** 2010 sales are only for December 2010; InsideEVs did not collect sales data before that point.

Sales data current through May 2018, based on InsideEVs May 2018 Plug-In Electric Vehicles Sales Report Card, published June 4, 2018.

Automakers increasingly report sales data only quarterly, so 2018 cumulative sales data is an informed estimate based on InsideEVs research.

 = model was for sale in U.S. in that year

Models in bold are the top 10 bestselling, 2010-present

## Electric Vehicles Are Here to Stay

The EV market in the United States is increasingly robust and diverse. Over the past decade, EV technology costs have dropped sharply and vehicle and performance options have multiplied.<sup>1</sup> Annual EV sales have grown nearly ten-fold since 2011 when there were just two mass market EVs available for sale in the United States to 2017, when the industry offered dozens of models from virtually all major manufacturers. By 2020, it is estimated that there will be well over 100 EV models for sale worldwide.<sup>2</sup> Figure 1 shows the growth of U.S. EV and plug-in hybrid electric vehicles (PHEV) sales and models available to U.S. drivers over the past eight years.

## EV Manufacturing is Also Growing

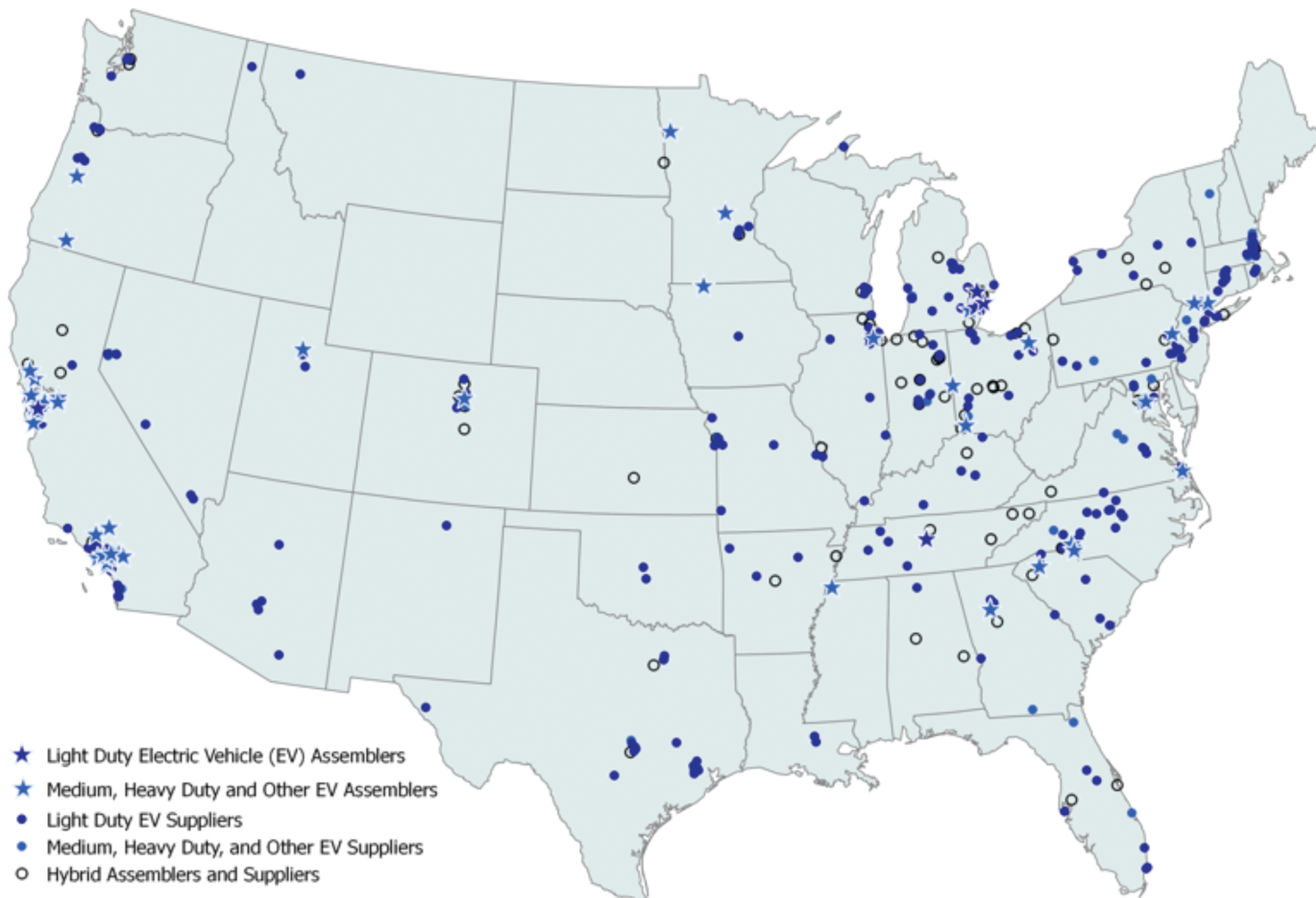
The U.S. is also a significant player in the EV manufacturing industry. The industry is at a turning point, however, and decisions made now will affect not just the retention of today's manufacturing and jobs,

but the foundation for the future success of the U.S. clean economy.

To date, the leading EV's in the U.S. market—the Chevy Volt, Nissan Leaf, and Tesla S and several others—are domestically assembled.<sup>3</sup> Hundreds of factories and tens of thousands of manufacturing workers in states all across the country are building EVs and the technology that goes into them. This includes workers in EV assembly plants, in EV propulsion and charging technology, and in components and materials shared with advanced conventional vehicles, but manufactured for use in EVs. It includes plants dedicated and built for EVs or EV technology, and conventional vehicle and technology facilities diversifying into electric drive. It also includes the increasing manufacture of batteries and power electronics—areas where the U.S. has not traditionally led.

While retaining and growing this capability will be critical to sustaining U.S. manufacturing and jobs over the long term, maintaining this progress is not a

**Figure 2: U.S. Electric Vehicle Manufacturing Today**





foregone conclusion. America's competitors in Europe and Asia are making deep investments,<sup>4,5</sup> and putting in place powerful policies to drive their manufacturing and technology leadership in advanced vehicles and the materials and components that go into them.<sup>6,7</sup>

Automotive suppliers are already raising concerns that should the U.S. step away from leading long-term fuel economy and vehicle GHG standards at the federal level, the next generation of investments in critical advanced and EV enabling technology—such as 48 volt electronic control systems—could take place in other markets.<sup>8,9</sup>

Continuing and accelerating the impressive progress begun in the advanced vehicle sector depends not just on technological progress, but on building and sustaining broad support for effective state and federal clean vehicle and related policies to compete with those being enacted worldwide. Ensuring support for these policies extends to the full range of transportation stakeholders—such as working and middle class families, key industry and labor stakeholders, and local communities. They, and the public, need to see real benefits (and certainly not losses) from new technology. To get to this place, the policies and frameworks under which clean vehicles of all types are deployed need to engage all stakeholders, and provide the public with confidence that advanced vehicle technology will deliver on the improved environmental, energy security, equity, and economic benefits it promises.

## **The Quality of Jobs Varies Widely Across the U.S. Automotive Sector**

While the initial growth in the domestic EV supply chain is a very positive development for the U.S. economy, any trend toward “low-road” manufacturing jobs in the industry as a whole is worrisome and could also put the future of U.S. clean technology leadership at risk. Across the automotive sector, leading manufacturing facilities demonstrate that meeting high job and workplace standards can be profitable and competitive. There are ongoing disparities within the industry, however, and a concerning trend towards lower standards in newer plants.<sup>10</sup>

While this review of the industry is ongoing, existing data show that wages, benefits, and working conditions for production workers across the industry vary widely. Looking across the supply chain, some manufacturers in the auto sector offer wages just over minimum wage

with no benefits and hazardous working conditions.<sup>11</sup> Others pay workers in the \$20-30 per hour range with full benefits and rigorous safety processes and oversight. Jobs in the automotive sector can either provide a ladder of training and rewarding career paths or they can be temporary and dead end jobs.<sup>12</sup>

Better working conditions and outcomes—whether in terms of wages and benefits, healthy and safe working conditions, or workers' rights on the job—are not just critical to workers and the prosperity of local communities. They are critical to a successful industry and to maintaining support for clean technology and clean energy policy.

## **Workers' Rights Remain Critical to Outcomes for Workers and the Economy**

Many of today's electric vehicles are manufactured—whether in the United States or overseas—in plants where workers are represented by a union. The freedom for workers to form their own union and bargain a contract without threats or intimidation from their employer is a key driver of good labor practices at any job. Not only are wages and benefits generally higher at union firms, they are higher, even for non-union employees, in states with higher overall rates of union representation. And the benefits of a negotiated collective bargaining agreement go beyond improved wages and benefits. When workers have a voice on the job, they can partner with an employer to improve quality, productivity, health and safety, access to training, and investments in advanced technologies.

Higher paid, more secure union jobs have historically been critical to driving economic growth and growing the American middle class.<sup>13, 14</sup>

**Figure 3: Examples of Sound Current Practices at U.S. Vehicle Assembly Plants**

Wages & Benefits	Job Security & Advancement	Health & Safety	Workers' Rights & Engagement	Equity & Community Engagement	Technology Transition
<p><i>Wages &amp; Wage Progression:</i> Starting wages for hourly employees begin \$17-19/ hour, rising to \$29+ /hour with transparent salary progression on the basis of defined seniority. Bonuses are driven by company performance and calculated on a transparent formula.</p> <p><i>Benefits:</i> Employees receive a strong package of benefits including: medical, dental, vision, paid vacation and sick time, retirement/401k plans, and life/disability.</p>	<p><i>Use of Temporary Labor:</i> Plants operate with only a small proportion of temporary labor (typically under 10 percent) utilized only for truly temporary purposes and for short-term time frames. Wages and benefits for any temporary workers, and the circumstances under which temporary workers are employed, are also known and set by contract.</p> <p><i>Training &amp; Advancement:</i> Contracts include systematic and defined opportunities for enhanced training, skills accrual, and advancement. Apprenticeship opportunities include tuition paid by the company.</p> <p><i>Job Security:</i> Companies have a set of transparent work rules and procedures, agreed to by workers and management, that govern topics including absences and overtime; fairness in advancement and promotion; grievance procedures; just cause and termination; and layoff and recall.</p>	<p><i>Workplace Health&amp; Safety:</i> Plants have joint and collaborative labor and management health and safety committees that identify and resolve existing or potential health and safety issues before injury, accident, or exposure to harm.</p> <p>These committees provide information and training, make improvements on the floor to machines and work rules, and enable workers to raise concerns about potential hazards.</p> <p>Plants undergo regular internal health and safety audits; workers participate in a health and safety program.</p> <p><i>Toxics Exposure &amp; Avoidance:</i> Similar joint committees develop and implement procedures to review toxic chemicals ahead of their introduction into production and make sure processes are safe.</p>	<p><i>Effective Collaborative Work Systems:</i> Automakers have consistently lead revolutions in manufacturing production. Best in class production systems rely on workers having a voice to improve productivity and quality. Well-functioning labor-management committees and systems harness workers' creativity and suggestions into concrete improvements.</p> <p><i>Voice at Work/Opportunity for Union Representation:</i> Workers have a seat at the table, the ability to negotiate working conditions, and to collaborate with management to improve quality and efficiency. Many advanced automotive manufacturers operate collaboratively with unionized workforces in the United States and elsewhere in North America, Europe, and Japan. Others have agreed to union neutrality—meaning that they will neither support nor oppose efforts by workers to organize—and achieve a voice at work by forming a union.</p>	<p><i>Equity on the Job:</i> Employees work under fair and transparent work rules enforced with a grievance procedure that gives workers the tools to combat favoritism, unilateral or unfair changes by the employer, and discrimination or disparate treatment where it occurs. Civil rights committees assist workers to proactively address problems and identify approaches to eliminating discrimination.</p> <p><i>Community Benefits:</i> Companies enter into enforceable community benefit agreements; invest in and implement effective programs to increase hiring, retention and career paths for women, people of color, and workers from local and low income communities; and enhance other community benefits, working jointly with community groups.</p> <p><i>Stakeholder Engagement &amp; Corporate Citizenship:</i> Companies set proactive and significant sustainability goals and measures and transparently report on progress against them. Companies lead locally, nationally or internationally, and participate in industry forums in areas such as environmental stewardship and waste reduction, labor rights in supply chain, diversity, anti-discrimination, and pay equity.</p>	<p><i>Investment in New Technology, Retooling, &amp; Skills:</i> Employers carry out ongoing reinvestment in the R&amp;D, manufacturing, plant, processes and human capital—including training, retraining or relocation—needed to prepare existing facilities and workforce to manufacture current and next generation products and technology.</p> <p><i>Collaboration in Technology Deployment:</i> Companies negotiate and agree on future product and technology investments and location as part of periodic contract negotiations with workers' representatives.</p> <p><i>Robotics &amp; Automation:</i> Automotive manufacturing has long been highly robotics-intensive. At best practice facilities, workers and management are jointly involved in designing, shaping, and troubleshooting robotics and other manufacturing technology introduction and deployment as technology changes.</p>

Getting labor standards and labor-management systems and practices right is also critical for business—a stable, highly trained workforce is increasingly important to enable high performance production systems in advanced manufacturing.<sup>15</sup> It is also critical to ensure that workers, local economies, and the public see clear and improved benefits from new clean technology if support for the policies upon which the industry depends is to be sustained.

## Sound Practices in the Industry Show the Way Forward

Fortunately, review of existing vehicle manufacturers also shows that responsible practices are widespread at companies that are profitable and competitive. The auto sector is highly capital and robotics intensive.<sup>16</sup> <sup>17</sup> This makes labor costs a relatively small part of the cost of any vehicle and it means that the industry can support—and relies on—highly skilled and comparatively highly paid workers.<sup>18</sup> It also enables and demands high performance production systems to smoothly and flexibly integrate people and machines to deliver high volumes of vehicles at very high quality.

Many manufacturers of conventional and electric vehicles provide decent and improving jobs and career paths; operate modern, safe, healthy, and equitable workplaces; have sound relationships with the surrounding community; and respect workers' rights and employ state of the art labor-management processes and systems.

While our research is ongoing, *Figure 3* describes some examples of best practices we see in both union and non-union vehicle assembly plants across the industry. While some of these examples clearly refer to practices taking place in the context of a union contract, others are drawn from non-union facilities.<sup>19</sup>

Policy matters in this arena as well. Looking as far back as the fuel economy and automotive manufacturing investments laid out in the bipartisan 2007 energy bill,<sup>20</sup> or as recently as an agreement in Los Angeles in 2017 around EV bus deployment,<sup>21</sup> highly successful examples already exist across the country, in which workers, communities, companies, and government have come together to support and implement policies that speed and adoption of cleaner vehicles and boost good jobs and manufacturing. As the current leader in this space, California, in particular, has the opportunity to shape its policy in ways that sustain broad public support, shape the emerging industry, and ensure the

state sees not only environmental, but economic, worker, and equity benefits from its investment.

## Conclusion

Continued U.S. progress, innovation, and gains in manufacturing EVs and EV technology will be critical to retaining the next generation of American manufacturing and jobs. Many of the market leading vehicles are domestically assembled, as are, increasingly, key electric powertrain components. Similarly, leading manufacturers are showing every day that America can lead in high tech innovative manufacturing while providing good jobs.

But all this progress could be at risk. These gains come at a time that countries worldwide are investing heavily and creating powerful policy drivers to spur leadership in EV technologies. To stay in this game, sustaining strong federal and state public policy and public investment will be critical.

This review shows that next generation vehicles are being built successfully today in next generation, forward-looking factories with sustainable employment practices. At the same time, elsewhere in the industry, conditions are poor or declining across key metrics.

For the United States to compete in this critical emerging industry, it will need investor and public policy support for a major investment in innovative, clean, automotive technology, and for the high skill, high wage advanced manufacturing capability necessary to be the best in the world. If we are successful, building good jobs and clean vehicles together will create a powerful engine of growth and play a key role in strengthening America's communities, the environment, and the economy.

## ENDNOTES

1. International Energy Agency, Global EV Outlook 2017 Two million and Counting. June, 2017. Available: <https://www.iea.org/publications/freepublications/publication/GlobalEVO Outlook2017.pdf>
2. Mashable “Here’s how every major automaker plans to go electric.” October 3, 2017. Available: <https://mashable.com/2017/10/03/electric-car-development-plans-ford-gm/>; Automotive News, “A car for every plug and purpose.” October 2, 2017. Available: <http://www.autonews.com/article/20171002/OEM05171009982/a-car-for-every-plug-and-purpose>
3. BlueGreen Alliance research on assembly location, sales based on InsideEVs.com June 4th, 2018. Plug-In Electric Vehicle Sales Report Card. Available: <https://insideevs.com/may-2018-plug-in-electric-vehicle-sales-report-card/>. Six of the top 10 models by U.S. sales are assembled in the U.S. Models include: Tesla Model 3, S and X, Chevrolet Bolt EV, Volt, Nissan Leaf.
4. New York Times, “European Automakers Prepare for an Electric Future.” March 6, 2018. Available: <https://www.nytimes.com/2018/03/06/automobiles/autoshow/european-automakers-electric-cars-geneva.html>
5. Forbes, “China Could Be the World’s First All Electric Vehicle Ecosystem.” March 6, 2018. Available: <https://www.forbes.com/sites/salvatorebabones/2018/03/06/china-could-be-the-worlds-first-all-electric-vehicle-ecosystem/#1e31ae1c130f>
6. European Automobile Manufacturing Association, “Overview of incentives for buying electric vehicles.” January 5, 2017. <http://www.acea.be/publications/article/overview-of-incentives-for-buying-electric-vehicles>
7. The International Council on Clean Transportation, “China’s New energy Vehicle mandate policy (final rule).” January 11, 2018. <https://www.theicct.org/publications/china-nev-mandate-final-policy-update-20180111>
8. Automotive News, “Supplier alliance seeks to minimize changes to fuel economy rules.” March 1, 2018. Available: <http://www.autonews.com/article/20180301/OEM10/180309785/supplier-alliance-lobbying-emissions-regulations-cafe>
9. NBC News, “EPA expected to announce rollback of Obama-era mileage standards.” March 30, 2018. Available: <https://www.nbcnews.com/business/autos/epa-expected-announce-rollback-obama-era-mileage-standards-n861416>
10. National Employment Law Project, *Manufacturing Low Pay: Declining Wages in the Jobs That Built America’s Middle Class*. November 2014. Available: <http://www.nelp.org/content/uploads/2015/03/Manufacturing-Low-Pay-Declining-Wages-Jobs-Built-Middle-Class.pdf>
11. Bloomberg, “Inside Alabama’s Auto Jobs Boom: Cheap Wages, Little Training, Crushed Limbs.” March 23, 2017. Available: <https://www.bloomberg.com/news/features/2017-03-23/inside-alabama-s-auto-jobs-boom-cheap-wages-little-training-crushed-limbs>
12. Economic Policy Institute, “Yes, Manufacturing Still Provides a Pay Advantage, but Staffing Firm Outsourcing is Eroding It.” March 12, 2018. Available: <https://www.epi.org/publication/manufacturing-still-provides-a-pay-advantage-but-outsourcing-is-eroding-it/>; National Employment Law Project, *Manufacturing Low Pay: Declining*
- November 2014. Available: <https://www.nelp.org/wp-content/uploads/2015/03/Manufacturing-Low-Pay-Declining-Wages-Jobs-Built-Middle-Class.pdf>
13. National Public Radio, “State of The Unions: Labor And The Middle Class.” June 6, 2012. Available: <https://www.npr.org/2012/06/16/155186594/state-of-the-unions-labor-and-the-middle-class>
14. The Atlantic, “Fewer Unions, Lower Pay for Everybody.” August 30, 2016. Available: <https://www.theatlantic.com/business/archive/2016/08/union-inequality-wages/497954/>
15. Jobs for the Future, *Minding the Gap: Investing in a Skilled Manufacturing Workforce*. October 2015. Available: <https://jfforg-prod-prime.s3.amazonaws.com/media/documents/Manufacturing-Summit-092915.pdf>
16. MIT Technology Review, “Manufacturing Jobs Aren’t Coming Back.” November 18, 2016. Available: <https://www.technologyreview.com/s/602869/manufacturing-jobs-arent-coming-back/>
17. Global Market Insights, “Automotive Robotics Market.” August 2017. Available: <https://www.gminsights.com/industry-analysis/automotive-robotics-market>
18. While labor percentage of vehicle price is closely held, estimates are often around or less than 10 percent. On the low end, the breakdown from Canada shows labor cost at 4.2 percent. Canadian Auto Workers, *Labour Costs, Vehicle Prices and Investment*. Available: [http://www.caw.ca/assets/pdf/590-Auto\\_Price.pdf](http://www.caw.ca/assets/pdf/590-Auto_Price.pdf)
19. These examples describe real practices at a specific plants and is based ongoing research.
20. BlueGreen Alliance, “The Advanced Technology Vehicle Manufacturing (ATVM) Loan Program: A Success Building the Next Generation of Technology in America.” March 25, 2015. Available: <https://www.bluegreenalliance.org/resources/the-advanced-technology-vehicles-manufacturing-atvm-loan-program-a-success-building-the-next-generation-of-technology-in-america/>
21. Jobs to Move America, “Labor and Community Groups Sign Landmark Agreement with Electric Bus Manufacturer BYD in Los Angeles.” July 17, 2017. Available: <https://jobstomoveamerica.org/labor-community-groups-sign-landmark-agreement-electric-bus-manufacturer-byd-los-angeles/>

Cover photo of Chevy Bolt, courtesy of General Motors.

**bluegreenalliance.org**

1300 Godward Street NE, Suite 2625  
Minneapolis, MN 55413

1020 19th Street NW, Suite 600  
Washington, D.C. 20036

369 Pine Street, Suite 700  
San Francisco, CA 94104