

STATEMENT

OF THE

ALLIANCE FOR AUTOMOTIVE INNOVATION

BEFORE THE:

**SUBCOMMITTEE ON SURFACE TRANSPORTATION, MARTIME,
FREIGHT, AND PORTS**

COMMITTEE ON COMMERCE, SCIENCE, and TRANSPORTATION

U.S. SENATE

HEARING TITLE:

**“Made in America: The Future of Automotive Innovation and Semiconductor
Chips”**

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PRESENTED BY:

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Chairman Peters, Ranking Member Fischer and distinguished members of the Committee: on behalf of the Alliance for Automotive Innovation (Auto Innovators) and our members, I thank you for the opportunity to appear at this hearing today to share my perspective on how the auto industry in the U.S. is at the forefront of innovation and the importance of a robust and resilient supply chains that enhance U.S. competitiveness in the future of mobility, as evidenced by the current challenges associated with semiconductors.

We appreciate continued engagement with your offices regarding the ongoing challenges in the semiconductor supply chain and supportive policies that can help to ease those constraints and develop future domestic production capacity, including fully funding the authorized programs from the *CHIPS for America Act* as accomplished in legislation in both chambers, including the bipartisan *United States Innovation Competitiveness Act* (USICA).

Maintaining and enhancing U.S. leadership in automotive innovation, however, is not just about the future of the auto industry – it is about the nation’s global competitiveness and economic security. The nations that lead the development and adoption of innovative vehicle technologies, such as electrification, connectivity, and automation, will also shape supply chains, define global standards and, potentially, reshape the international marketplace.

The Alliance for Automotive Innovation was formed in 2020 to serve as the singular, authoritative, and respected voice of the automotive industry in the United States. Our 17 manufacturer members produce nearly 98 percent of the cars and light trucks sold in the U.S., and our 21 supplier and value chain members are responsible for integral parts and technologies in these vehicles. In total, our industry employs roughly 10 million Americans, in addition to those who are employed in the technology and mobility sectors directly.¹ We account for nearly six percent of our country’s gross domestic product and represent our country’s largest manufacturing sector.²

Today, we are on the verge of a transformation in the automotive industry in the United States that will fundamentally alter personal mobility. Through substantial, long-term investments in electrification,³ as well as advanced safety technologies, including automation, the industry is redefining motor vehicle transportation. Likewise, government policies, investments and programs must be modernized and transformed to reflect changes in the global marketplace and gaps in the global supply chain.

¹ Auto Alliance multi-industry contribution analysis: the economic impact of automotive manufacturing, selling, repairing, renting, and additional maintenance modeled using IMPLAN economic analysis data software, 2017 data year.

² *Id*; Bureau of Economic Analysis, Gross Output by Industry, <https://apps.bea.gov/iTable/iTable.cfm?ReqID=51&step=1>, Last accessed June 1, 2020; Bureau of Labor Statistics, Employment and Output by Industry, <https://www.bls.gov/emp/tables/industry-employment-and-output.htm>, Accessed June 1, 2020

³ For the purposes of this document, the term electrification includes all zero emission or electric vehicles (“ZEVs” or “EVs”), including plug-in and plug-in hybrid EVs as well as fuel cell technologies.

Globally, the automotive industry annually invests more than \$125 billion in R&D, \$20 billion more than the software and internet technology industry.⁴ Roughly \$24 billion of this annual investment occurs in the U.S., which supports 108,000 jobs and harnesses the innovation and ingenuity of major automakers and their workforce.⁵ As part of this commitment to bring new cutting-edge vehicle technologies to the U.S. market, the auto industry relies on high-quality patents and the fair and reasonable licensing of standardized technologies.

While the U.S. is well positioned to continue its long-standing leadership in automotive innovation, we cannot be complacent. Across the globe, nations are backing bold commitments with government investments and supporting policies. China has already established EV battery supply chain and manufacturing dominance. Likewise, Europe is responding by developing its own supply chains. Japan has made a bold commitment to support fuel cell technology advancements.

China is moving aggressively to lead in safety technology advancements – including AVs. As evidenced by experience in other sectors – such as information and communications technologies – as well as the current EV battery supply chain, falling behind global competitors presents long-term risks to U.S. competitiveness and economic security.

The industry’s commitment to a cleaner, safer, and smarter future for personal mobility remains on display as the nation – and the world – grapple with numerous ‘once in a generation’ challenges at the same time. Through a worldwide pandemic and amid turmoil that is currently disrupting global supply chains, Auto Innovators’ members continue innovating, building on decades of experience in precision manufacturing, supply networks, logistics, and purchasing to sustain and boost manufacturing, production and distribution in the U.S.

Senators in both parties clearly understand the reality facing the automotive industry. Despite the industry’s resiliency over the past two years, there is no question that lingering uncertainties associated with the COVID-19 public health emergency, along with recent global conflicts and other disruptions will continue to influence consumer trends and stress supply chains, like what our industry is currently experiencing with semiconductors, further straining the capital resources necessary to invest in future technology development.

At a time when demand for semiconductors has and will continue to increase across all sectors, the auto industry represents one of the fastest and most substantial growth sectors for the semiconductor industry. Semiconductors are used in a wide and growing variety of automotive electronic components that perform vehicle control, safety, emissions, driver information, and other critical functions. In addition, there are many innovations underway in the automotive

⁴ Strategy&, “The Global Innovation 1000 Study,” Data Download 11/2/2020
https://www.strategyand.pwc.com/gx/en/insights/innovation1000.html?utm_campaign=sbpwc&utm_medium=site&utm_source=articletext

⁵ National Science Foundation, Info Brief, “[Businesses Reported an 11.8% Increase to Nearly a Half Trillion Dollars for U.S. R&D Performance During 2019](#),” 11/18/21

space that will define the future of safety and mobility – including electrification, automation, and connectivity – that are highly dependent on semiconductors. The transformations underway across the auto industry are driving increased demand in the number and variety of semiconductors necessary for automotive production.

The chips that are generally used in vehicles are not the same chips that are used in consumer electronics devices. As with many defense and industrial control users, auto manufacturing relies on a wide range of chips, including a substantial number of mainstream – also known as mature, legacy, or lagging-edge – nodes. Further, the chips used in many automotive applications must be more robust and reliable than leading edge chips that are used in consumer electronics devices because they must withstand challenging internal and external environments for the useful life of the vehicle. These dynamics are reflected in the below chart from the USITC.

Figure 1. Different Requirements of Consumer and Automotive Semiconductor End Use Markets

Semiconductor Feature	Consumer Electronics	Automobile Electronics
Process Technology	28 → 7 nanometers	180 → 7 nanometers
Temperature Range	32 – 100 Degrees Fahrenheit	-40 – 300 Degrees Fahrenheit
Operating Lifetime	3 – 5 Years	15 Years
Tolerated Failure Rate	<1,000 parts per million	Zero parts per billion
Long Term Supply Needed?	No	Yes, up to 30 years' worth

Expanding and securing existing supply chains, while developing new ones, is a key factor in whether the U.S. will remain a leader in automotive innovation. Currently, the auto industry is facing substantial production losses stemming from capacity challenges across the semiconductor supply chain. This shortage of semiconductors is an outgrowth of a confluence of factors: an unexpected and unprecedented eight-week shutdown of vehicle production across all of North America (and similar closures across the globe); a rapid increase in demand for consumer products as the global population adjusted life in response to the COVID-19 public health emergency; disruptions to semiconductor manufacturing and packaging around the world due to public health restrictions, natural disasters and a major plant fire; a resurgence in demand for personal transportation; and changes in consumer discretionary spending, among other factors. As a result of these supply chain constraints, numerous automakers have been forced to halt production and cancel shifts in the United States, with serious consequences for their workers and the communities in which they operate.

Unfortunately, production forecasts in North America continue to be adjusted downward. In February 2021, industry was predicting that production would fall by 1% due to the chip shortage. By May, production forecasts had fallen by 5%. As 2021 drew to a close, forecasts had fallen by 21% for the year.⁶ According to industry analysts, motor vehicle production losses in

⁶ IHS Market, emails, “IHS Markit Monthly Automotive Update - February 2021,” 2/16/2021 and “IHS Markit Monthly Automotive Update - December 2021, 12/10/21

North America exceeded 3 million vehicles in 2021 due to these disruptions.⁷ The data also suggests that North American production is being disproportionately impacted relative to other global markets. For example, North America, which historically produces around 17 million vehicles annually, lost more than 3 million units in 2021. In contrast, China, which historically produces more than 24 million vehicles, announced production losses of 1.9 million vehicles.⁸ While there is no industry consensus on how long the shortage will continue to impact production, and where, analysts estimate supply challenges are likely to persist into 2023.

These production shortfalls come at a time when sales inventory of vehicles in the U.S. is at an all-time low. In fact, in September 2021, light vehicle inventory fell below 1 million units for the first time in decades. This is a 64% drop in inventory from the prior year. Since then, vehicle stocks have started to make small, incremental gains, but remain 60% lower than a year ago and 74% lower than the same period in 2019. Likewise, days' supply is currently at 24, compared to 78 in February 2019.

Automakers and value chain partners are working diligently to navigate these current supply chain challenges. For example, OEMs are employing a range of strategies to manage available supplies, including shifting chip supply to meet consumer demand, reducing content in production vehicles, partially manufacturing vehicles and parking them for later completion, and other measures to manage the near-term supply constraints. At the same time, semiconductor production capacity is at all-time high, with more units shipped – across all sectors – in Q3 2021 than any quarter in history.⁹ In addition, there is increased collaboration and engagement between OEMs and suppliers as companies seek to improve long-term planning within the semiconductor supply chain.

Even as automakers and suppliers work to navigate the current landscape, there is an undeniable need to expand semiconductor manufacturing capacity and regional diversity to support a robust and resilient semiconductor supply chain that meets the growing demands of the auto industry, as well as other sectors of the economy. This requires a significant investment in, and sustained commitment to, building additional domestic semiconductor capacity – from mature to leading-edge - that meets the future needs of the auto industry in the United States. For this reason, Auto Innovators strongly supports full and robust funding for the programs authorized under the *CHIPS for America Act* as well as enactment of a semiconductor manufacturing investment tax incentive such as the one proposed in the *FABS Act*.

Semiconductors, of course, are just one example of the type of investments needed to support U.S. leadership and job growth. But the challenges and opportunities before us are bigger than any one component part, policy, branch or level of government, or industry sector. For the U.S.

⁷ Automotive News, *The latest numbers of the microchip shortage: Have factory cuts peaked?*, December 20, 2021, available at <https://www.autonews.com/manufacturing/latest-numbers-automotive-microchip-shortage-15> (Data supplied by Autoforecast Solutions, Inc.)

⁸ IHS Market, emails, “IHS Markit Monthly Automotive Update - February 2021,” 2/16/2021 and “IHS Markit Monthly Automotive Update - December 2021, 12/10/21

⁹ <https://www.semiconductors.org/q3-global-semiconductor-sales-increase-27-6-year-to-year/>

to remain a leader in the development and adoption of transformational automotive technologies, we need a comprehensive national vision and strategy rooted in economic, social, environmental, and cultural realities. That comprehensive strategy must address several pertinent and pressing questions:

- What supply chains are available, and will they need to change? What are the challenges to developing the U.S. supply base for specific new technologies?
- How are we preparing or repositioning the U.S. workforce, including auto workers, suppliers and related workers for these new technologies?
- What are the impediments to consumer adoption and affordability of advanced vehicle technologies, including electrification and automation?
- How do we address the challenges and barriers unique to certain communities, such as rural and disadvantaged, and ensure advanced vehicle technologies are accessible and beneficial to all Americans?
- What other industries, sectors or stakeholders will be necessary to realize the potential of these important transformations?

These are but a few of the challenging questions at the core of maintaining U.S. competitiveness and enhancing U.S. leadership in automotive innovation. Strategies must account for these realities, otherwise they could, inadvertently, harm the nation's workforce, limit consumer options, and jeopardize our nation's economic future and global competitiveness. Our goal is to avoid such outcomes by continuing to work collaboratively with policymakers and other stakeholders to maintain the U.S.'s global leadership in automotive innovation.

Auto Innovators believes that realizing this future requires a sustained holistic approach with a broad range of complementary supply- and demand-side legislative and regulatory policies. To that end, we have developed a series of proposals that match dynamic public policy with significant private investment and engagement. The foundational piece to all of these proposals is our Innovation Agenda which recognizes the key realities and factors necessary for the U.S. to remain the leader in automotive innovation. We have subsequently released more specific policy recommendations, to highlight critical technologies and the importance of a predictable policy environment to preserve and enhance U.S. leadership in a number of automotive policy areas as outlined below.

Accelerating Acceptance of Electric Vehicles:

Electric vehicles are one of the best examples of why a comprehensive vision and strategy is crucial to building successful markets for the next generation of vehicle technologies. From 2017 through 2030, Automakers and their battery partners will invest \$91.8 billion in the U.S. to

electrify their products. On a global scale, automakers are planning to invest \$515 billion globally over the next decade to bring exciting new EV models to market, including battery, plug-in hybrid, and fuel cell electric vehicles.

Auto Innovators' [Get Connected Electric Vehicle Quarterly Report](#) shows steady growth in the EV sector. Through the fourth quarter of 2021, EV sales comprised 78 different models and represented over 4 percent of the light-duty market – up from 2 percent of the light-duty market in 2020. By mid-decade, IHS Markit predicts that there will be 130 EV models available in the U.S.

Even with this steady growth in EV market share, meeting the goals of automakers and policymakers alike, and achieving requirements in the EPA's final greenhouse gas emissions rule for model years 2023-2026, will require a significant increase in EV sales. However, with the right complementary policies in place, and a sustained national investment in those policies, the auto industry is poised to accept the challenge outlined by President Biden of driving new EV sales to between 40 and 50 percent of the market by 2030. To meet this goal, a comprehensive approach that includes investments and supportive government policies is needed with a focus on three key areas: consumer affordability and awareness; charging and hydrogen fueling infrastructure; and innovation, manufacturing, and supply chain.

Auto Innovators and our member companies commend the bipartisan efforts that went into enacting the Infrastructure Investment and Jobs Act (IIJA). Notably, the \$7.5 billion included in the law for electric vehicle charging and hydrogen fueling infrastructure is an important first step in jumpstarting public investment in a nationwide charging and hydrogen fueling network. Currently, there are 44,500 publicly available EV charging locations and 110,158 charging ports nationwide – representing a 16 percent increase since January 1, 2021. While the \$7.5 billion is a crucial investment in expanding availability of public charging stations, substantially more will need to be invested – by both utilities and the public and private sectors. The bipartisan IIJA law also included supportive provisions for supply chains for clean energy technologies, including those related to battery manufacturing and recycling. These funding streams will certainly provide key components in supporting innovation and developing the necessary supply chains to support the expansion of EVs in the U.S.

Auto Innovators remains committed to continuing to work with Congress, the Administration, and policymakers at all levels of government to craft the additional complementary policies necessary to make EVs more affordable for all consumers, further the development of charging and hydrogen fueling infrastructure, and continue to boost investment in the domestic EV supply chain to enhance U.S. leadership in developing the technologies to achieve a cleaner transportation future.

In fact, as today's hearing examines American manufacturing and supply chains, the supply side represents one of the best opportunities to develop long-term and sustainable U.S. leadership in automotive innovation. Vital aspects of the EV supply chain require the manufacturing of

batteries and battery components (critical minerals extraction, processing, battery cell production, end of life recycling) and fuel cell stacks. In 2019, Chinese chemical companies accounted for roughly 80 percent of the world's total output of advanced battery raw materials. Investments in tax incentives, grants, and loan programs for both R&D and manufacturing can help to provide the support needed to develop and bolster the U.S. supply chain and manufacturing capacity for EVs. Such programs will allow manufacturers to retool, expand, or build new facilities for the manufacture of light-, medium-, and heavy-duty plug-in and fuel cell electric vehicles, and their batteries, fuel cells, components, and related infrastructure that will be key factors in driving automotive innovation in the United States for generations to come.

The AV Policy Roadmap:

I would be remiss if I did not emphasize the potential that Automated Vehicles (AVs) have to increase the safety of our nation's roadways by decreasing the number of motor vehicle crashes due to human error. They also hold promise to provide numerous social and economic benefits, including increased mobility for older adults and people with disabilities, reducing traffic congestion, reducing emissions, and fostering investment and economic growth.

The U.S. has an opportunity to advance global leadership in developing these revolutionary technologies and new mobility business models through a national approach that reduces uncertainty and paves the way to long-term success. That is why, in 2020, we released the *Policy Roadmap to Advance Automated Vehicle Innovation*.

The Roadmap outlines the auto industry's AV policy priorities and includes fourteen specific recommendations that can be implemented by federal policymakers over the next four years to facilitate the testing and deployment of AVs at scale. These recommendations are focused on reforming regulations, harmonizing policies, and laying the foundation to achieve longer-term objectives – including expanding the number of exemptions that DOT can provide on a case-by-case basis--with safety oversight and full enforcement powers--which can then provide the data necessary to support future Federal Motor Vehicle Safety Standards for AVs.

Innovating for a Safer Future:

If the U.S. is to remain a global leader in automotive safety innovation, our policies and programs must keep pace. Uncertainty with respect to safety priorities from both a regulatory and consumer education perspective can be an impediment to investment in advanced safety technologies. The New Car Assessment Program (NCAP) is an important tool used by NHTSA to educate consumers on vehicle safety through easily understood ratings. NCAP modernization is long overdue. Unfortunately, the program has not been updated since 2011 and has failed to keep pace with innovations in crash avoidance technologies.

An effective and consistently maintained NHTSA NCAP, guided by mid- and long-term roadmaps, will leverage market forces to accelerate the development and deployment of

advanced safety technologies.

That is why last year Auto Innovators released the *Plan to Advance Safety at the Speed of Innovation*. This document outlines our vision for a 21st Century NCAP, including five recommendations to ensure that NCAP achieves its main objectives of providing meaningful information for consumers, accelerating the deployment of safety technologies, and supporting future regulatory activity.

In addition to longer-term recommendations, our plan also encourages an immediate “Kick Start” that would incorporate five crash avoidance technologies into the NCAP program. These include:

- Forward Collision Warning/Automatic Emergency Braking (FCW/AEB)
- Pedestrian Automatic Emergency Braking (PAEB)
- Lane Departure Warning (LDW)
- Lane Departure Warning with intervention/Lane Keep Assist (LDW/LKA)
- Automatic High Beam Headlamps/High Beam Assist

These are all proven safety technologies that are already helping to avoid costly crashes, while saving lives, on our nation’s roadways today. The key to building greater consumer acceptance and adoption of these foundational advanced driver assistance systems (ADAS), and future safety technologies such as AVs, is consumer education that creates awareness about the life-saving potential of these innovations.

The value of an NCAP that has developed a process for continuously evaluating emerging safety technologies and folding them into a Long-Range Roadmap for vehicle manufacturers cannot be overstated. It permits automakers to develop long-term safety strategies that are aligned with the identified NCAP safety priorities and expected updates. As a result, when updated ratings are implemented, manufacturers have had enough time to have products in place that provide the enhanced safety performance. This is a “win-win-win” scenario for government, vehicle manufacturers, and especially consumers.

Conclusion:

The auto industry has long been an economic engine for the nation that millions of workers depend on for their livelihoods. The industry is poised to remain the bedrock of U.S. innovation and manufacturing for decades to come. Realizing this potential, however, requires collaboration, cooperation, and creativity among all stakeholders.

It is imperative that we work collaboratively to develop a robust, national approach to automotive innovation that encourages and incentivizes research and development, testing and deployment, investment in a resilient supply chain, and bolstering U.S.-based manufacturing of advanced technologies, while also mitigating unintended consequences of narrow policy objectives. Likewise, a failure to embrace and encourage adoption of advanced vehicle

technologies in the U.S. risks ceding technology leadership and supply chain dominance to global competitors. The nations that lead the development and adoption of innovative vehicle technologies, such as electrification, connectivity, and automation, will also shape supply chains, define global standards, and potentially, reinforce U.S. auto manufacturing and leadership in the international marketplace. This is not just about the future of the auto industry in the U.S. — it is about the nation’s global competitiveness and economic security.

On behalf of Auto Innovators and our member companies, I look forward to working with both Congress and the Administration to develop and implement policies such as those discussed to realize the promise of cleaner, safer smarter transportation future while ensuring the U.S. leads automotive innovation for generations to come.