



ALLIANCE
FOR AUTOMOTIVE
INNOVATION

2024
INNOVATION
AGENDA

BACKGROUND

The global automotive industry is undergoing a generational transformation. Through substantial, long-term investments in electrification and more efficient drivetrains¹, advanced safety technologies, including automation and connectivity, the industry is creating a cleaner, safer, and smarter future for personal mobility. It is no longer a question of when these technologies will prosper but where and at what pace. And the next decade will define which nations shape the future of automotive innovation and manufacturing. Amid intense global competition, the U.S. must resolve to support the development, commercialization, and acceptance of these innovative technologies that will redefine motor vehicle transportation for decades.

This inflection point comes at a challenging time for the auto industry. During the past four years, the industry has been stressed by previously unimaginable circumstances, including: a global pandemic that idled all North American production facilities for the first time since World War II; a global shortage of semiconductors which severely limited vehicle production; supply chain disruptions fueled by congestion, bottlenecks, and workforce challenges across transportation modes and global supply chains; Russia's invasion of Ukraine; mounting regulatory requirements across the globe that require increased levels of vehicle electrification, and rising inflation.

At the same time, consumer demand has proven surprisingly robust, creating periods of misalignment between demand and production capacity. This has strained vehicle inventories, reduced affordability, and, potentially, reshaped the consumer car-buying experience.

This is the backdrop for one of the most capital-intensive technology transformations in the history of the auto industry. In the face of tremendous uncertainty, automakers are investing more than a \$1 trillion globally over the next decade into the technologies and innovations reshaping the industry. These are massive bets (including over \$125+ billion in the U.S. alone), and the success of these investments depends on numerous factors largely beyond the control of the auto industry and comes as global competitors are moving aggressively to develop automotive technologies and supply chains.

This is not just an inflection point for the auto industry, but the nation's manufacturing sector and related workforces. The U.S. must remain a leader in automotive innovation and manufacturing or risk becoming dependent on foreign sources, in a future increasingly defined by others.

Today, the auto industry employs 9.7 million Americans, in addition to those employed in the technology and mobility sectors. It accounts for nearly five percent of U.S. gross domestic product and represents the nation's largest industry² within the manufacturing sector.

This is what is at stake. The nations that lead the development and adoption of innovative technologies, such as electrification, connectivity, and automation, will also shape supply chains, define global standards, and reshape 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.

BACKGROUND

To remain a leader in the development and adoption of these transformational technologies, the U.S. needs a comprehensive national vision and strategy rooted in economic, social, environmental, and cultural realities.

- Which supply chains are available and how stable will they be? What are the challenges to developing the U.S. supply base for a specific technology? How can we work with allies and partners to address those challenges?
- How are we preparing or repositioning the U.S. workforce, including auto workers, suppliers, and other segments of the automotive value chain for these new technologies?
- What are the impediments to consumer adoption of innovative technologies – from advanced safety systems to electrified vehicles?
- How do we address the challenges and barriers unique to certain communities, such as rural and economically 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?
- How will innovative technologies reshape consumers' relationship with their vehicle, as well as the vehicle's relationship to society? How will this influence other social, economic, and stakeholder interests throughout the automotive value chain?

These are the challenging questions at the core of a comprehensive approach to maintaining U.S. competitiveness in automotive innovation. Strategies or government policies that do not account for these realities and decisions deferred could, inadvertently, harm the nation's workforce, limit consumer choice, and handcuff our nation's global competitiveness. Our goal must be to avoid such outcomes by continuing to work collaboratively with policymakers and other stakeholders to maintain U.S. global leadership in automotive innovation.

This document is an outline for the broader conversation about what it will take to continue to prepare the U.S. for the future of automotive innovation, manufacturing, and personal mobility. It is a step toward developing the connective tissue and bipartisan support necessary to realize policy objectives through a shared understanding of economic and political realities.

SUPPLY SIDE TRANSFORMATION

While many traditional policy approaches focus on demand-side solutions (consumer incentives and technology mandates, for example), these only contribute to sustained U.S. leadership if they align with supply-side realities. In fact, the supply side represents one of the best opportunities to develop long-term and sustainable U.S. leadership in automotive innovation.

1. Incentivize R&D

Globally, the automotive industry annually invests \$125 billion in R&D.³ The National Science Foundation estimates \$30 billion was spent in the U.S. in 2022. These investments harness the innovation and ingenuity of major automakers, their suppliers, and the collective workforce.⁴ Faced with challenging economic headwinds, companies must allocate resources toward technologies with the most promise, or markets with the most regulatory certainty. The U.S. can advance its position in automotive R&D by:

- Enhancing R&D incentives over the next 3-5 years;
- Pursuing robust and holistic intellectual property policy that recognizes the strategic imperative of innovation in the auto industry;
- Avoiding overly restrictive export control policies that could undermine the competitiveness of U.S.-based innovation in the global market; and
- Facilitating and expanding access to capital to support such transformations over the next 3-5 years.

2. Modernize Regulatory Approaches for Advanced Technologies

Regulatory uncertainty creates tremendous challenges for companies looking to make investment decisions, especially in the current economic and regulatory environment. For example, the U.S. has presented an attractive market for investments in the research, testing, and development of advanced safety technologies. However, the U.S. risks falling behind global competitors moving proactively to embrace and deploy these technologies. The U.S. can strengthen its position as a global leader in safety innovation by:

Advancing U.S. Leadership in Automated Vehicles (AVs)

AV technologies have the potential to revolutionize motor vehicle safety — as well as address mobility concerns such as congestion, emissions, equity, and quality of life — while also fueling a \$2 trillion global industry. Through 2022, a mix of more than 80 traditional automakers, suppliers, technology companies and startups invested billions of dollars to research, develop, test, and/or deploy a range of new, cutting-edge AV technologies across the U.S.⁵ The U.S. can advance global leadership in developing these revolutionary technologies and new mobility business models through a national approach that reduces regulatory uncertainty and paves the way to long-term success. **This coordinated approach would benefit from elements such as modernizing or adapting regulatory approaches to accommodate new technologies, clarifying and aligning federal and state roles and responsibilities, supporting development of and public exposure to the technology through large-scale pilots and/or demonstration programs, and advancing consumer education and awareness, among others.**

This should occur at the federal level to avoid a patchwork of state policies or regulations which, while well intentioned, do not offer the certainty necessary to scale key safety technologies in a manner that supports industry investments, provides data necessary for regulators, or keeps pace with international competitors.

SUPPLY SIDE TRANSFORMATION

Modernizing Regulations and Updating the New Car Assessment Program (NCAP)

Uncertainty with respect to safety priorities from both a regulatory and consumer ratings perspective has a chilling effect on investment in advanced safety technologies in the U.S. It is critical that existing regulations are updated to support the deployment of advanced crash protection and crash avoidance features that are already commonplace in other parts of the world, and that any new regulations are appropriately harmonized to enable faster introduction into the US market.

In addition, an effective and consistently maintained NHTSA NCAP, guided by comprehensive mid- and long- term program roadmaps, will leverage market forces to accelerate the development and deployment of advanced safety technologies – many of which serve as the building blocks for AVs.

Over the past few years, it is clear the speed of innovation is outpacing traditional approaches to regulation and policy development. Working together, we can modernize and evolve policies and regulations to support the broader transformation to smarter, safer, and cleaner personal transportation. There are many examples across the regulatory landscape — from clean energy, to data, privacy, security, and beyond — where creativity and collaboration present opportunity for U.S. leadership and innovation.

3. Support Manufacturing and Supply Chain Investments

Global competitors have already established market dominance over certain supply chains and become the primary manufacturing base for certain innovative technologies. For example, China dominates the critical mineral global supply chain and EV battery manufacturing, creating potential long-term economic and national security risks. Transitioning the existing U.S. supply base and retooling manufacturing facilities to produce the latest vehicle technologies will require substantial time and resources.

From 2021 to 2023, the auto industry has invested more than \$113 billion in 18 states across the U.S. to modernize the U.S. industrial base and create more than 74,000 new jobs.⁶ Likewise, policymakers have supported additional investments through provisions included in federal legislation over the past two years. These substantial contributions from industry and government represent the first step in a massive transformation of the U.S. supply base for motor vehicles.

In the coming years, we must ensure these investments and incentives facilitate a transition that keeps pace with regulatory requirements and market demands that will ensure U.S. leadership and limit the risk of workforce loss due to international investments elsewhere.

Further, we must look holistically at these emerging and future supply chains, from mineral extraction to battery end-of-life, to define realistic pathways for robust, resilient, and reliable access to those supply chains. Failure to make these investments today will cement future dependence on foreign competitors for the minerals and components critical to the future of the industry.

Over the past two years, the semiconductor crisis has been a painful lesson in the importance of diverse supply chains for critical components – a canary in the coal mine of the challenges we'll face in this period of rapid transformation.

SUPPORTING INVESTMENTS

In order to reduce dependence on unreliable or adversarial foreign sources for critical components we must be proactive and forward-thinking to establish robust and resilient supply chains – both domestically and globally - necessary to support the future of the industry. This won't happen overnight, although it is well underway.

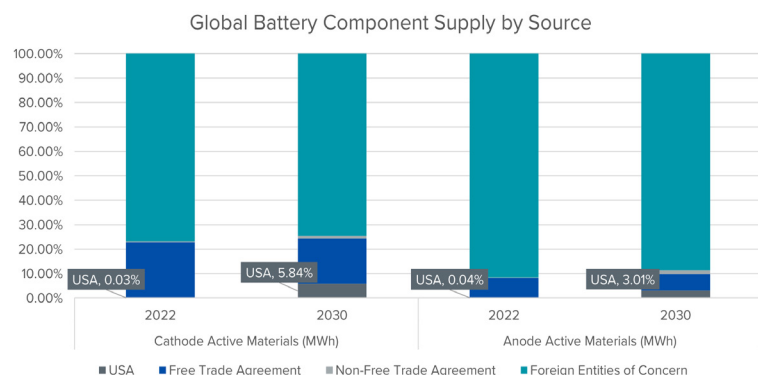
SUPPLY SIDE TRANSFORMATION

China, for example, dominates critical mineral mining and processing. China is also a giant auto market - nearly twice the size of the U.S. market. U.S. based automakers are manufacturing American-built vehicles with American labor and exporting automobiles to China.

This includes, for example, a circular economy for EV battery materials. At the same time, the U.S. cannot expect to develop and support entirely domestic supply chains in just a few years that are necessary to keep pace with the rapid evolution of the industry, especially in electrification where massive global demand already outpaces existing supply chains.

Today, the U.S. lacks sufficient geologic deposits of several critical minerals and the mining and processing capacity to support the growing demand and regulatory requirements for electric vehicles. New mines and processing facilities face long lead times for permitting and development, raising questions about how quickly domestic capacity can be developed. “While it only takes two to four years to bring battery cell and active component manufacturing online, mining and refining can take 10-15 years of development and an additional ten years until nameplate capacity is reached. The lag time between permitting, opening, mining, and refining available critical minerals domestically and processing the material into components and building the cells is significant, leaving the U.S. dependent on foreign sources of minerals for at least a decade.”⁷ [See Get Connected for more information on critical minerals and mines.](#)

As U.S. EV manufacturing grows, we need complementary support for the entire supply chain, including mining, processing and associated permitting reform, to reduce dependence on foreign sources. We also need to work collaboratively with neighbors, allies, and friendly nations to establish robust and resilient supply chains, even if they extend beyond our borders. Failure to do so will stress limited global capacity and – as witnessed with the semiconductor shortage – result in constrained supply and higher prices for consumers.



4. Encourage Evolution of the Workforce

Innovative automotive technologies have the potential to disrupt or transform existing jobs, professions, or even industries. Since these transitions will not happen overnight, we have an opportunity to understand and develop solutions to minimize how technology could possibly impact the greater workforce. In addition to the suite of complementary policies necessary to preserve the U.S. manufacturing and supply base, additional measures include developing or examining:

- Training programs to educate and facilitate a transition of the existing workforce;
- Programs to attract and develop a pipeline of new talent; and
- The way specific technologies may impact direct and indirect jobs throughout the automotive value chain.

COMPLEMENTARY DEMAND SIDE POLICIES AND PROGRAMS

Supply side measures are vital to transitioning and sustaining U.S. leadership in technology innovation and manufacturing, especially in the face of robust competition and direct investment from China and other nations. These efforts, are moot without a robust market and customer demand for these innovative technologies.

ZERO EMISSION VEHICLES BY THE NUMBERS

In the case of Zero Emission Vehicles (ZEVs), the auto industry plans to invest \$1.2 trillion in vehicle electrification by 2030⁸ and roughly 150 models will be available in the U.S. by 2026.⁹

Despite 103 electric models available today, just over 9 percent of all light-duty vehicles sold in the U.S. through September 2023 were zero emission vehicles.¹⁰ Strategies that facilitate consumer awareness and wider-scale adoption are critical to sustaining a robust supply base and providing a smooth transition to advanced clean technologies.

Rather than viewing this through the lens of “cost parity” to achieve meaningful consumer acceptance, we need to examine supportive policies that take it a step further, toward “convenience parity.” This is most applicable in the context of EVs — what is necessary to reach a point where a consumer can go shopping for a new vehicle and look at the EV and internal combustion engine (ICE) options with few questions about the relative costs, ease, or convenience of ownership between the two?

Unfortunately, the ratio of publicly available EV charging infrastructure is widening and going in the wrong direction despite continued private and public sector investments to ensure reliable public EV charging across the country. The same is required from the utility sector to ensure the level of power needed to service both light and medium-heavy duty vehicles is commensurate with state and federal regulatory requirements (see [Get Connected](#) for more information on charging infrastructure and modernizing the electric grid).

Similarly, for advanced safety technologies we must work collaboratively and proactively to ensure consumers, infrastructure, and society are prepared to realize the benefits of integrating advanced and automated technologies on America’s roadways.

For example, consumer education around these advanced safety technologies is critical for understanding and public acceptance. From the terminology used to describe these technologies, to showing consumers how these systems function, and more importantly, what their capabilities and limitations are, there are many opportunities to advance consumer understanding and awareness of advanced safety technologies, especially when taking into consideration the rise in roadway fatalities in recent years. **A recent study by the Insurance Institute for Highway Safety showed that automatic emergency braking technology reduces rear-end crash rates by 50 percent and rear-end injury crash rates by 56 percent.¹¹ Advanced safety technologies on the road today are providing countless benefits for drivers from reducing the severity of crashes to preventing them from happening altogether.**

Finally, the transformation underway in the auto industry will not only reshape vehicle technologies, it will also reshape consumers’ – and society’s - relationship with vehicles. Connectivity, for example, opens the door to new capabilities, services, and conveniences for consumers. As we move toward an automated future, it introduces opportunities to introduce more immersive and engaging capabilities, content or services for consumers and passengers. Whether it is a shift in how vehicles are fueled, to evolving sales, distribution, or ownership models, new technologies introduce disruptions to traditional business models and expectations. We must be prepared to work collaboratively to navigate the challenges and opportunities associated with the evolution of the industry.

COMPLEMENTARY DEMAND SIDE POLICIES AND PROGRAMS

This is an opportunity to address existing barriers – and prepare for new evolutions – to ensure the U.S. is a leader and not a follower in the adoption and use of the technologies defining the future of the auto industry. The following examples reflect the supportive or complementary measures necessary to achieve regulatory requirements or policy objectives to accelerate acceptance and integration of innovative technologies:

1. Consumer Incentives

All new technologies are more expensive when they first enter the market and those costs are reduced over time through scale. This historic reality is magnified by the scale of the transformation underway in the automotive industry.

Consider the current market for EVs.

While industry has made significant progress in driving down electric vehicles costs — specifically battery technology, which is the largest cost-driver for EVs – growing demand for EVs coupled with global supply chain challenges have introduced new cost pressures. As a result, these vehicles up-front cost generally remain more expensive than their ICE counterparts, especially in the larger vehicle platforms favored by American consumers. Even when we get closer to price parity, challenges around convenience factors, such as access to or cost of home charging infrastructure or the ability to drive longer distances and quickly “refuel,” could remain impediments to widespread consumer adoption.

As cost and convenience gaps persist, broad-based non-discriminatory consumer incentives (at the state and federal level) remain a strong complementary policy tool to drive greater EV adoption. In New York, for example, electric car sales surged 74 percent when the state implemented an electric car rebate. And in Georgia, sales dropped 90 percent when the EV incentive was phased out. Incentives can range from state or federal purchase/lease incentives to consumer benefits such as free or preferred public parking, HOV access, and free charging, among others.

While recent legislation at the federal and state level have included consumer incentives for the adoption of EVs, we must continue to work collaboratively to ensure they remain available to the broadest number of vehicles and consumers as the market matures. Similarly, consumer incentives are not a panacea and must be coupled with other supply and demand-side measures.

2. Infrastructure Investment

Infrastructure is the foundation of transportation. For the technologies of the future, infrastructure does not just mean roads and bridges, but the investments that are foundational to the success of evolving vehicle technologies. For example, access to convenient and reliable electric charging and hydrogen fueling infrastructure along with concerns surrounding “range anxiety” are among the most substantial impediments to widespread EV adoption. Geographic disparities in charging infrastructure are pervasive. At the end of 2022, nearly 30 percent of all public charging infrastructure was located in California. Of the more than 3,100 counties in the U.S., 63 percent had five or fewer chargers installed; 39 percent had zero. The top 14 counties with the highest number of chargers accounted for 30 percent of all U.S. EV charging infrastructure.¹²

COMPLEMENTARY DEMAND SIDE POLICIES AND PROGRAMS

Failure to align infrastructure investments or incentives will impede EV adoption and undermine shared policy objectives. We must build on recent progress, including the bipartisan infrastructure bill, and continue to work collaboratively on near-term policy support, such as federal tax incentives or grants to spur charging and refueling infrastructure development, but also on long-term questions – such as the need for properly integrating EVs with the electrical grid, and the effect on grid resilience – to realize a sustainable market for these technologies.

Likewise, while developing adequate charging and refueling infrastructure is a challenge across all communities, it is especially pronounced in economically disadvantaged communities, multi-unit dwellings, and urban settings where access to in-home charging is likely not an option.

Similarly, realizing the safety and societal benefits of vehicle connectivity and communications (broadly, V2X), requires thoughtful and strategic investments in connected infrastructure. The U.S. was a leader in the advancement of connected vehicles. In recent years, however, the U.S. has fallen behind global competitors in the deployment of this life-saving technology. In the U.S., the government has reduced the amount of spectrum for V2X technologies while other nations are increasing allocations. As a result, the U.S. risks ceding the development and, critically, supply chains for connected vehicle technologies to global competitors. There is time to regain momentum, but it will require the U.S. Department of Transportation to develop and implement a national strategy to ensure we have the infrastructure – and spectrum – necessary to realize U.S. leadership in a connected future.

Investments in V2X-enabled infrastructure have the added benefit of complementing and supporting the adoption of automated vehicles. While most AV technologies are being developed to operate independently, V2X technologies open new possibilities for efficiency and congestion reduction, as well as enhanced awareness and engagement with human-driven vehicles, pedestrians, cyclists, and other vulnerable road users.

These are factors that must be taken into consideration by federal, state, and local planning efforts.

3. Building Codes

The Department of Energy estimates at least 80 percent of vehicle charging occurs at home.¹³ Most homes and businesses, however, lack the electric infrastructure to support vehicle charging, creating additional expense or inconvenience for those seeking to adopt the technology.

As part of a holistic approach to ensure that supply/demand barriers are reduced, we need to work together with state and local governments to carefully consider what is necessary to equip homes and businesses (especially new construction) with the infrastructure to support cleaner transportation both now and in the future. Multiunit dwellings (MUDs) like apartment or condominium buildings pose a particular challenge to ubiquitous home charging capabilities. A large number of MUDs can be found in underserved communities where construction and accessibility to charging infrastructure should be prioritized in order to ensure entire communities have the opportunity to participate in the EV transformation.

COMPLEMENTARY DEMAND SIDE POLICIES AND PROGRAMS

4. Lead by Example

Federal and state governments have an opportunity to lead by example and maximize EV adoption by prioritizing purchases for public fleets. This action also has the benefit of ensuring growing demand for EVs, while also socializing consumers to the reality of EVs on American roadways. Further, government employees' experience of driving and charging an EV, even if only for work, helps expand consumer awareness to diverse communities, as they share their experience with family and friends.

Similarly, AVs introduce new opportunities for public transit agencies and operators. For example, the integration of AVs into public transit programs could expand access and use, especially for underserved communities or populations, through first/last mile options or expanded reach into "transportation deserts." This can increase the value of existing public transportation resources and investments, while also opening new economic and mobility opportunities for communities across the country.

5. Consumer Education and Awareness

No amount of industry investment, regulatory requirements, or public sector support will keep the U.S. at the forefront of automotive innovation if consumers are not prepared to accept and understand the benefits of new vehicle technologies. The technologies shaping the future of the auto industry will alter consumer expectations, engagement, and the overall relationship with the vehicle. For some, new vehicle technologies can be unsettling.

For example, efforts are underway to enhance consumer education by standardizing terms and definitions of advanced safety features using an industry-consensus approach to deliver intuitive, easily understood descriptions. The industry is also working closely with key federal regulators to devise new and innovative ways to educate consumers on the functionality and use of advanced safety technologies.

Alliance for Automotive Innovation is collaborating with the National Highway Traffic Safety Administration to further educate consumers about the capabilities and limitations of automated driving features, such as Level 2 ADAS, to curb misuse and abuse by drivers. Keep in mind, there are no commercially available vehicles for sale today that are fully self-driving and don't require the attention or engagement of a human driver.

All stakeholders have a responsibility to ensure consumers understand and embrace the promise of innovative automotive technologies. This will not happen overnight and will vary across communities. This is why collaboration at all levels of government is so important.

ECONOMIC CONTRIBUTIONS

The Auto Industry is an economic¹⁴ engine:

- 9.7 Million Jobs
- \$702 Billion in Paychecks
- \$1 Trillion Put into the Economy by Auto Manufacturing Each Year
- \$280 Billion Annually in the Form of Federal, State, and Local Tax Revenues
- 4.8% Of U.S. GDP
- \$30 Billion in U.S.-Based Research and Development Projected for 2022¹⁵
- More than 1 Million Direct Jobs¹⁶
- \$97 Billion in Exports in 2022 – Shipped to 206 Countries Around the World

A TIME FOR ACTION

The U.S. has long been a leader in automotive innovation. Every year the industry invests tens-of-billions-of-dollars in the U.S., from R&D and patents to manufacturing facilities and supply chains, supporting more than \$1 trillion in economic activity. All across the country, companies –new and established – are at the forefront of testing, deploying, and manufacturing next generation technologies. This not only benefits the auto industry and our workforce, but also the communities in which they operate –along with other sectors of the economy that leverage our innovations and share similar supply chains, including defense and aerospace.

While the U.S. is well positioned to continue its long-standing leadership in automotive innovation, we cannot be complacent. Globally, nations are backing bold commitments with government investments and policy support to alter the marketplace to their advantage. As evidenced by experience in other sectors –such as information and communications technologies and the current EV battery supply chain –falling behind global competitors presents long-term risks to U.S. competitiveness and economic and national security.

For the millions of workers depending on the auto industry for their livelihoods, we must seize this window of opportunity. While recent legislative and regulatory proposals at the state and federal level rely upon a high degree of vehicle innovation and consumer adoption, the importance of sustaining the leadership of the U.S. auto industry is far from certain.

We must continue working collaboratively to develop a coherent and sustained national approach to automotive innovation which opens the door to endless possibilities and avoids the unintended consequences of focusing on narrow policy objectives. Technology mandates and regulatory requirements without complementary supply side investments will erode the U.S. manufacturing base for innovative technologies. A failure to embrace and encourage adoption of advanced vehicle technologies in the U.S. will cede technology leadership and supply chain dominance to global competitors. Fortunately, we have made some progress, but long-term success will be defined by sustained commitment and collective understanding of what is at stake.

The auto industry is an economic engine for the U.S. and 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. This is an opportunity to open our minds to new possibilities and work together to take a fresh, comprehensive look at what it will take to realize a shared vision of a cleaner, safer, smarter future.

REFERENCES

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- ¹⁶ Bureau of Labor Statistics, Employment, Motor Vehicles and Parts Manufacturing, October 2023