

**DRIVING INNOVATION:  
THE FUTURE OF AUTOMOTIVE MOBILITY,  
SAFETY, AND TECHNOLOGY**

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**HEARING**

BEFORE THE

SUBCOMMITTEE ON SURFACE TRANSPORTATION,  
MARITIME, FREIGHT, AND PORTS

OF THE

COMMITTEE ON COMMERCE,  
SCIENCE, AND TRANSPORTATION

UNITED STATES SENATE

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

APRIL 27, 2021

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SENATE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION

ONE HUNDRED SIXTEENTH CONGRESS

FIRST SESSION

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**TUESDAY, APRIL 27, 2021**

U.S. SENATE,  
SUBCOMMITTEE ON SURFACE TRANSPORTATION,  
MARITIME, FREIGHT, AND PORTS,  
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,  
*Washington, DC.*

The Subcommittee met, pursuant to notice, at 2:30 p.m. in room SR-253, Russell Senate Office Building, Hon. Gary Peters, Chairman of the Subcommittee, presiding.

Present: Senators Peters [presiding], Klobuchar, Blumenthal, Fischer, Thune, Luján, and Lummis.

**OPENING STATEMENT OF HON. GARY PETERS,  
U.S. SENATOR FROM MICHIGAN**

Senator PETERS. The Committee will come to order.

First, I'd like to thank each of our witnesses for joining us for today's very important discussion. Few innovations have had as great an impact on the modern world as the automobile.

Over the last hundred years, the auto industry has helped our country achieve some of its greatest successes, from creating millions of jobs that have supported generation after generation of middle class families to using its manufacturing prowess to help America win World War II to fostering some of the most cutting edge technological developments that the world has ever known.

It's no exaggeration to say that the invention of the automobile quite literally transformed society as we know it, and I'm proud that Michigan has played a leading role in these achievements.

But as fascinating as auto history is, we're here to talk not about the past but we're to talk about the future and that's an exciting topic because the possibilities are endless, and there's no question we're at a crossroads now when it comes to mobility.

How do we maintain our leadership on the global stage? How do we seize this opportunity to ensure mobility innovation is just as transformative as the invention of the automobile itself?

I want to start by addressing the most important topic first: safety. Almost 40,000 people die each year in crashes on U.S. roads. Those are more than just statistics. Those are husbands and wives, sons and daughters, loved ones, and close friends. Each and every year, families all across our country are forced to grieve the losses that occur on our roads and highways.

There must be a better way to address safety on our roads. Whether it's incorporating new technologies or improving safety rules, we must take action. Doing so will literally save lives.

That's why I'm committed to comprehensively working to improve safety. This includes efforts, like passing legislation, such as the RIDE Act, which we will hear about today, so that we can spare families from preventable tragedies.

I've also committed to working with the auto industry to achieve a future technology innovation and the contributions of auto-workers to solve some of the most pressing challenges that we face.

One of the most important opportunities we can seize is autonomous vehicle technologies. We know that autonomous vehicles save lives since 90 percent of accidents are caused by human error. We know that these technologies are also rapidly emerging and are already impacting the workforce, and we know that our competitors on a global stage, especially China, are recognizing the benefits of these technologies and, let's be clear, let's be absolutely clear, these technologies are coming inevitably.

If we want to continue being the mobility capital of the world, we must allow innovation to continue and we cannot afford to wait until countries, like China, seize the moment.

Allowing for the safe testing, the research, development, and deployment of these technologies will not only cement American leadership but bring with it economic growth and good paying jobs with improved safety and that's why I'm committed to working with the auto industry, stakeholders, my colleagues in Congress, and the Biden Administration to ensure we can update Federal rules and allow these technologies to emerge safely.

And with your help, Congress can chart a very bright future for our country, a future where innovation improves mobility for our communities while also protecting the environment, a future that transforms mobility in the way that our society operates for the better, a future where we grow manufacturing jobs here in the United States to support a new century of opportunity for middle class Americans, and a future where new technologies prevent the kind of tragedy that struck the Abbas family.

With that, I invite Ranking Member Fischer to share her opening remarks. So good to see you.

**STATEMENT OF HON. DEB FISCHER,  
U.S. SENATOR FROM NEBRASKA**

Senator FISCHER. Good afternoon, and thank you, Chairman Peters, for convening today's hearing. I appreciate the opportunity to work with you again on this subcommittee. I look forward to getting a lot done. So thank you.

As we both know, this subcommittee has an important role to play as we debate how to fix our infrastructure. Members of the Subcommittee have worked on a number of bipartisan measures, including the PIPES Act of 2020, reauthorizations of the Maritime Administration, and reauthorization of the Federal Maritime Commission.

The Chairman and I have already introduced bipartisan legislation this Congress to advance our understanding of the scope and severity of blocked railroad crossings.

When it comes to surface transportation reauthorization programs, last authorized in the FAST Act of 2015, set to expire on September 30th, I hope we can work together to advance bipartisan transportation proposals. That starts with today's hearing on innovation and safety in the automotive industry.

Advances in automotive technology show promise for improving safety and the passenger experience. Some examples of technology that are already available in newer vehicles include various types of driver-assist features, automatic emergency braking, and cameras to provide a greater view of our surroundings. Fully autonomous driverless vehicles may even deliver groceries to your homes soon.

What I hope to hear from our panel is an update on where the automotive industry is today, where we want to see it go, and the Federal policies that will help us get there.

First and foremost, our Federal policies should prioritize the safety of those who are on the road. In 2019, there were 36,096 traffic fatalities on U.S. roads. More alarming are the National Safety Council's preliminary estimates for 2020 which shows that there were 42,060 motor vehicle deaths last year, despite the fact that Americans drove 13 percent fewer miles than in 2019. Each one of those fatalities is a family member, a friend, and a loved one.

Even more tragic is the fact that according to the U.S. Department of Transportation, a major factor in 94 percent of fatal motor vehicle crashes is human error. The choices that we make every day on the road affect us all.

Last year, this subcommittee heard testimony from highway safety professionals who discussed the role that Federal, state, and local governments play in road safety.

Today, we have the opportunity to add to that record by hearing from our witnesses about innovative ideas that can improve both safety and the passenger experience.

I look forward to hearing from Mr. Bozzella and Ms. Wilson about the advances that members of their associations are making to improve the driving experience.

I would also like to know how current Federal regulations impact their work to advance new technologies.

And I look forward to hearing Mr. Sarkar's unique perspective as President and CEO of the American Center for Mobility. Having the leader of a third party testing facility here today will provide important context on the present and future prospects for automotive innovation.

And Ms. Rana Abbas Taylor, I want to especially thank you for your willingness to share your story with us today. I had the opportunity to talk with a constituent earlier this year who shared the story of his daughter, Alexis Victoria Cathey, who was killed by a drunk driver. What happened to your family is a tragic reminder that there is more to do to address drunk and impaired driving.

I look forward to hearing from our witnesses. Thank you, Mr. Chairman.

Senator PETERS. Thank you, Senator Fischer.

Our first witness today is Rana Abbas Taylor, who will bravely share the story of her family members who were tragically killed

by a drunk driver in a horrific incident that shocked the conscience of everybody in Michigan and really the entire nation.

I remember attending the funeral in Dearborn and the outpouring of support and grief was just so overwhelming. No family ever, ever should have to endure the heartbreak of what happened on January 6th of 2019.

Rana's incredible advocacy for improving safety is a testament to her family's memory. We're grateful for her dedication to saving the lives of Americans traveling on our roads.

Ms. Abbas Taylor, welcome to the Committee. You are now recognized for your five minute opening comments.

**STATEMENT OF RANA ABBAS TAYLOR, SURVIVOR/ADVOCATE,  
MOTHERS AGAINST DRUNK DRIVING**

Ms. TAYLOR. Thank you, Chairman Peters, Ranking Member Fischer, and the Committee for holding this hearing.

My name is Rana Abbas Taylor, and I am from Northville, Michigan. I'm here representing MADD and millions of drunk driving victims. We are so thankful that you've recognized that MADD's viewpoint is critical to your deliberations.

While it is with gratitude that I join you today, the truth is I wish I didn't have to be here. On January 6, 2019, my world, the only one I have ever known, collapsed. In a split second, I lost nearly my entire family because a drunk driver was able to get into a vehicle, take that vehicle on to the wrong side of the same freeway my family was on and collide with them head on. Killed instantly were my sister and only sibling Rima, my brother-in-law Issam, my two nieces, Isabella and Giselle, and my nephew Ali. That driver had a BAC nearly four times the legal limit, yet he was able to operate a vehicle and senselessly end the lives of five incredible people.

Rima, an exceptional physician, committed her life to healing and saving lives. Issam, an expert litigator, was dedicated to making the world a better place and pursuing justice for all. Ali or A.J., as we called him, was 13 and inherited his parents' compassion and strong belief in justice. Isabella or Izzie was 12. She was gentle and empathetic and had a deep love for animals. Giselle or Jazz was only seven and showered our world with happiness, joy, and sunshine.

It is not OK that my parents had to bury their daughter, son-in-law, and all of their grandchildren. It is not OK that I don't have my only sister by my side or that I'll never hear the words Auntie Rana again. It is not OK that we have the technology and the ability to prevent these tragedies, yet we still debate this matter.

Congresswoman Dingell and Senator Peters showed up for my family during our darkest days. Congresswoman Dingell's attendance at our family services was a catalyst for her introduction of the Honoring Abbas Legacy to Terminate Drunk Driving or HALT Act. She has now been joined by Representatives McKinley and Rice on this bipartisan bill.

HALT will lead to tech-neutral solutions for drunk driving prevention tech in all new cars. I am grateful for the network of incredible advocates that I have come to know through MADD. I am honored to be part of this movement.



For months, MADD has hosted weekly calls with dedicated victims advocating for the HALT and RIDE Acts. I'm submitting a letter to the Committee from these victims. Our purpose is to get this legislation across the finish line.

Just last week, Senators Luján and Scott, who have personally felt the pain of drunk driving, introduced the RIDE Act. Chair Peters, MADD is honored that you are also a co-sponsor of RIDE. I am so grateful to the three of you for your leadership.

The tech to stop drunk driving exists. MADD knows and has submitted for the record over 200 forms of tech that NHTSA can consider today as part of a process to set standards for impairment prevention tech. Many of these technologies could be deployed now at minimal cost and should be standard features on all new vehicles.

My family is proud to hail from the Motor City. I grew up with the big three in my backyard. The auto industry is a true innovator, building cars that better protect their occupants. The time to act is now. The longer we wait, the more people die.

I am here in honor of my family, in honor of Issam, Rima, A.J., Izzie, and Giselle. I am also here in honor of every victim in our weekly calls who've loved lost ones and in honor of every person whose life has been taken senselessly by a drunk driver, hoping to continue the work my baby sister committed her life to, saving lives.

Rima was a formidable force. She was my hero, but even heroes, especially heroes, hurt from the pain they are made to bear witness to. Few of us saw the vulnerable side of Rima. She maintained a fierce and stoic façade and she took very seriously the fact that her strength is what everyone, including her family, relied on.

Rima would phone me on her drives home from a difficult day, especially after having diagnosed a patient with a terminal illness or, worse, when she'd lost a patient. It was always personal to her.

During our talks, she would unpack her pain with me as her way of seeking help to carry it so that she could be present for her family by the time she made it home. I fight this battle because it is personal for me, too. I do this work for those who are unable to in a humble attempt to continue my promise to unpack and carry and help heal for Rima.

Thank you.

[The prepared statement of Ms. Taylor follows:]

PREPARED STATEMENT OF RANA ABBAS TAYLOR, SURVIVOR/ADVOCATE,  
MOTHERS AGAINST DRUNK DRIVING

Thank you Chairman Peters, Ranking Member Fischer and Members of the Committee for holding this critical hearing today. My name is Rana Abbas Taylor and I am from Northville, Michigan. I am here representing Mothers Against Drunk Driving (MADD) and hundreds of thousands of drunk driving victims and survivors throughout the country.

Every day 28 people die in drunk driving crashes in the United States—that's one person every 52 minutes. In 2019, 10,142 people were killed in alcohol-related crashes on our Nation's roads. And approximately three hundred thousand more were seriously injured.

MADD has worked tirelessly since 1980 to prevent drunk driving crashes and to serve the victims of this 100 percent preventable crime. Thanks in part to the leadership of this Committee, we have advanced successful public policies such as the 21 Minimum Drinking Age Law, the national .08 blood alcohol concentration (BAC) standard, open container laws, repeat offender laws, high visibility enforcement

campaigns and all-offender ignition interlock laws—policies which have saved countless lives. But our work is not done.

Your focus on technology and innovation today is well timed and very much needed. There is no question that technology enhancements can and must play a major role in reducing deaths and injuries on our roads.

We will hear today from industry experts who know first-hand that the auto industry is in the midst of a technological revolution. I am inspired by the knowledge and experience at this hearing. I offer a deeper perspective. I thank you, Chair Peters and Ranking Member Fischer, for recognizing that MADD's viewpoint is critical to your deliberations. I am not here representing a business. I am here representing people in pain. People who are demanding change so that no other family has to experience what we experience every day of our lives: unbearable loss.

#### **The Crash: January 6, 2019**

While it is with the sincerest gratitude that I join you at this important hearing today, the truth is, I wish I did not have to be here. I should not have to be here. On Jan. 6, 2019, my world—the only one I had ever known—collapsed. In a split second, I lost nearly my entire family, because a drunk driver was able to get into a vehicle, take that vehicle onto the wrong side of the same freeway my family was driving on, and collide with them head-on. Killed instantly were my sister Rima, who was my only sibling and best friend; my brother-in-law, Issam; my two nieces, Isabella and Giselle; and my only nephew, Ali. They were returning home to Northville, Michigan from a family vacation in Florida.

The individual who killed my family near Lexington, Kentucky had a BAC nearly four times the legal limit—a level so high it is lethal. Yet, he was able to operate a vehicle in this condition and senselessly wipeout the lives of five incredible people—an entire family. My family. What I didn't know then was that technologies exist that could have saved their lives and prevented any drunk driver from operating a vehicle.

I remain unable to adequately articulate the magnitude of this horrific tragedy. There are no words and, I have come to learn, no language that exists that can convey the enormity of this kind of loss. From this unimaginable pain and heartbreak was born a personal obligation that no family should ever have to suffer like ours did. Let me be clear, my family did not ask for this fight, it came crashing down on us. Sometimes, we don't choose our battles, our battles choose us.

#### **My World: Rima, Issam, Ali, Isabella, Giselle**

While I remain at a loss when it comes to articulating the impact of this tragedy, there are not enough words to describe how extraordinary these five people that were ours were.

My sister, Rima, 38, was not just a physician, she was the best kind; the kind that had waiting lists of patients who would schedule appointments months in advance just to see her; the kind who really listened; the kind who sat with patients for as long as they needed and helped them navigate their fears; the kind who gave out her cell phone number to them, so that she was always within reach. Five months prior to her death, Rima had been promoted to a regional director position with Beaumont Health. Even though this new role was meant to be primarily administrative, upon her insistence and without any additional pay, she chose to continue her patient care. She had committed herself to medicine and to healing. She refused to give that up.

My brother-in-law, Issam, 42, was both a successful attorney and real estate agent, who had chosen to pursue the field of law because of his passion for justice and his conviction that it is our responsibility to use the legal mechanisms we have in place to make the world a better, safer place for all. He was a dedicated husband, father, brother, uncle and friend, who lived by example. As an expert litigator, he carried a deep commitment to fairness and equity.

Ali, or AJ as we called him, was 13. He was an old soul in a young boy's body who had inherited his parents' compassion and strong sense for a just world. His greatest desire, as evidenced by a school project, was for equity in our world. He particularly hoped for access to clean water for everyone. His ultimate concern, though, was for his family's well-being. He would worry incessantly about his parents making it home safe when they were out without him, and he would often call them, inquiring of their whereabouts.

Isabella, better known as Izzy, was 12, and was most like her mother: gentle, empathetic and softspoken. She was the kindest and most giving of humans and was the first to volunteer to help someone in need or make a new student feel welcome. She carried a deep love for animals, especially her two pet cats. At the time of the crash, one of her listed 'to-dos' for the New Year was to bake apology cookies for

her friends at school for forgetting a Secret Santa gift exchange that final Christmas. She never got to.

Giselle, or Jazz, was only seven. Despite being the youngest—or perhaps because of it—she packed the biggest personality, showering every room she walked into with happiness, her magnificent smile and her special brand of goofiness. She was pure joy and sunshine. As her nickname indicated, she was the music in our lives. Her idea of fun included spending time with those she loved most. Rather than go Black Friday shopping with her mom that final November, she had insisted on being dropped off at our house so that she could eat stale Goldfish crackers and help my husband, Tom, and I trim our Christmas tree.

It is not okay that Ali, Isabella and Giselle were robbed of a future and the opportunity to realize their full potential. It is not okay that my parents had to bury their daughter, son-in-law and all of their grandchildren. It is not okay that I do not have my one and only sister by my side, or that I will never hear the words ‘Auntie Rana’ again. It is not okay that countless others have lost loved ones to drunk driving and suffered unspeakable trauma as a result. And it is not okay that we have the ability and know-how to prevent these tragedies from happening and save thousands of lives a year and, yet, we are still debating this matter.

### **Courageous Leadership: MADD Congressional Heroes**

Among the thousands of individuals impacted by this tragedy who attended my family’s funeral was Congresswoman Debbie Dingell and Senator Gary Peters of Michigan. Senator Peters—thank you for showing up for my family during our darkest days. Your compassion means everything to us. And thank you for hearing my family, and recognizing that the auto industry can do this.

I have known and worked closely with Congresswoman Dingell for over a decade on various issues that matter mutually to us. As she later shared with me, during the services she had been approached by a classmate of my nieces and nephew who asked her how something like this could have happened. She further asked why something can’t be done to prevent the loss of lives like her friends—my nieces and nephew. That conversation was the catalyst for why we are here today.

Within days of Rima, Issam, Ali, Isabella, and Giselle’s preventable deaths, Congresswoman Dingell led the way by proposing groundbreaking legislation that over the past two years has been refined to reflect what is included in Honoring the Abbas Legacy to Terminate Drunk Driving Act, or HALT Act, today: a mandate for a rulemaking that would lead to a technology-neutral solution for getting drunk driving prevention technology in all passenger vehicles.

Just a few weeks ago, Congresswoman Dingell, along with Congressman David McKinley of West Virginia and Congresswoman Kathleen Rice of New York, co-sponsored the bipartisan HALT Act, which will mandate technology that will save 9,400 lives a year, according to a study released last year by the Insurance Institute for Highway Safety. By comparison, airbags, mandated by the Intermodal Surface Transportation Efficiency Act of 1991 that went into effect in 1998, save about 3,000 lives a year. Seatbelts save 15,000 lives a year.

Just last week, Senator Rick Scott of Florida and Senator Ben Ray Lujan introduced a companion bill in the Senate. Both Senator Lujan and Senator Scott have shared their personal stories with MADD victims and survivors privately. Five days ago, at a press conference announcing introduction of the RIDE Act, they shared their personal stories publicly. Senator Lujan and Senator Scott—thank you.

You are one of us. You are victims and survivors yourselves, and you understand our pain. To have you lead this effort in the Senate is comforting to me and my family. We are unstoppable. Your stories—our collective stories—are our power.

Senator Scott—thank you for being with us since the beginning of the last Congress. MADD Immediate Past National President Helen Witty sends her gratitude from Florida. She greatly values your leadership, as do I. You are a fierce advocate for drunk driving victims.

Senator Lujan—thank you for effortlessly picking up the baton from long-time MADD champion Senator Tom Udall. Your vulnerability with New Mexico victims and current MADD National President Alex Otte will forever be remembered. We appreciate you and are grateful for your advocacy and leadership.

I cannot express how grateful I am for Congresswoman Dingell’s courageous and swift action and leadership to create legislation in my family’s honor that would end the single biggest killer on our Nation’s roads, and for Congressman McKinley, Congresswoman Rice and Senators Lujan and Scott’s unwavering leadership on this issue. Even as the months, and now years, have gone by since that horrific day for my family, Congresswoman Dingell has remained steadfast in her commitment to seeing this legislation through and sparing thousands of families the indescribable pain and loss that we will carry with us for the rest of our lives.

I would also like to thank you, Senator Peters, for the commitment you made to my family to help us develop a regulatory framework for moving forward. You have been so wonderful to us, and we appreciate your support, insight and leadership more than you will ever know. I remember when we met in your office in October 2019—me, my husband Tom, along with members of Issam’s family. You saw our intense pain. You sat with us for an hour. And we talked about the technological revolution that was going on in the auto industry.

Senator Fischer, MADD Nebraska victims appreciate your commitment to stopping drunk driving. When victims and survivors met with you recently, you showed them so much compassion. You have shown true commitment to understanding the available technologies and what the RIDE Act will achieve. You have shown MADD that you are here to help us navigate and move forward. Thank you.

#### **MADD War Room: United by Grief and Purpose**

I want to pause for a moment to say these words slowly and let them sink in: becoming a MADD victim/survivor is not a club that anyone wants to join. Absolutely no one should ever have to endure what my family has had to endure and continues to endure. And at the same time I am so honored and privileged to be a part of this movement for change, and getting to know and volunteer with some of the most incredible advocates I have ever met.

Some victims and survivors grieve in silence. Others grieve loudly. Grief affects people in very different ways. Expressions of grief are varied and that’s OK. There are many of us who grieve loudly together every Thursday at 5pm ET on our MADD “War Room” calls. Our purpose is to push the RIDE Act across the finish line. We started these weekly calls many months ago as a way to stay connected, focused, and organized. We begin each call with a “Mission Moment,” listening to one group member each week tell their story and share pictures of their loved ones. We then have everyone report out on what meetings they have had, and discuss next steps. We tell each other “We’ve got this.” And our grief has purpose. To save others from the pain we endure. Those saved by passage and implementation of the RIDE Act will never know . . . but we will.

#### **The Auto Industry CAN End Drunk Driving NOW**

Some—not many—have questioned MADD victims and survivors as we have virtually fanned out across Capitol Hill, meeting with Members of the House and Senate. While we are not experts on vehicle technology development or selling cars, we are victims of a preventable crime who want to stop drunk drivers from being able to use their cars as weapons. We also happen to know that the auto industry can 100 percent solve this problem.

Over the past century, the auto industry has made huge strides in building cars that better protect their occupants. Speed control, lane departure warnings, automatic emergency braking, and airbags throughout the vehicle are some of the technologies that are widely deployed and even taken for granted today.

MADD has collected information from various sources inside the industry and outside the industry. More than 200 forms of technology currently exist that NHTSA can consider as part of a Federal rulemaking process to set standards for drunk driving and impairment prevention technology. These innovative technologies, or a system of these technologies, will eliminate drunk driving. Many of them could be deployed today, at minimal cost. And MADD is here to say that life-saving drunk driving prevention technology must be a standard feature on all new vehicles. The auto industry tells us all today that they are leaders in innovation. I believe them. After all, I grew up with the “Big Three” in my backyard. My family is proud to hail from the Motor City. Today, on behalf of my family and the millions of victims of this devastating crime, I ask the auto industry to support the HALT Act in the House and the RIDE Act in the Senate. Let’s move forward with a technology-neutral rulemaking and reach a goal of No More Victims together.

#### **Drunk Driving Prevention Technology: Three Categories**

Drunk driving accounts for nearly one-third of all highway traffic deaths and represents the single biggest cause of carnage on America’s roads. Make no mistake: drunk driving is a national public health crisis. Our sense of urgency is palpable: the longer we wait, the more people needlessly continue to die.

MADD is technology-neutral and is committed to NHTSA’s development of standards and thresholds to determine the best solutions through a rulemaking process. On January 11, 2021, MADD submitted a response to NHTSA’s Request for Information (RFI) on drunk driving prevention technology. I would like to submit an updated response for the hearing record. Our RFI update outlines 241 different technologies, most of which are already available. These technologies can be put into 3

broad categories: 1) driving performance monitoring technologies; 2) driver monitoring technologies; and 3) passive alcohol detection technologies.

#### *Driving Performance Monitoring Technologies*

This type of technology is already available on cars. For example, all new cars include an Advanced Driver Assistance Systems (ADAS). This is a series of sensors that look at the world on the outside of the car. Usually, it is used for Lane Assist, emergency braking, blind spot warning, etc. But it can be, and has been by some auto makers, programmed to detect erratic/reckless driving. Most drunk drivers, including the one who killed my family, exhibit reckless driving prior to a collision. Because the hardware is already on all new cars, enabling this existing tech is a one-time software change, the incremental cost to enable ADAS Systems to prevent drunk and impaired driving is \$0.

#### *Driver Monitoring Technologies*

The second category is driver monitoring technologies. Many new cars—Volvo, Jaguar Land Rover, Subaru, Lexus (in certain places around the world), Mercedes, BMW, Cadillac, etc., are already equipped with driver monitoring technologies. These technologies are based on cameras that focus on the condition of the driver. Usually these systems are programmed just to detect drowsy or distracted driving. But these technologies also have the capability to accurately detect the dilation of eyes, and the distracted perspectives of drunk and impaired drivers. Currently, this adds about \$200 per car. If mandated on all cars, industry sources say the cost will drop to about \$100 per vehicle. Once again, if already installed on cars, this is just a one-time software change so the incremental cost would be \$0. The drunk driver who killed my family was served 22 drinks and had a BAC that was nearly four times the legal limit. I believe this technology would have prevented the drunk driver from killing my family.

#### *Passive Alcohol-Detection Technologies*

The third category is passive alcohol-detection technologies. I'd like to make a clear distinction between "active" alcohol-detection technology and "passive" alcohol-detection technology. Active technology means the driver must actively breathe into a tube in order for the device to register BAC. This is the how ignition interlock technology works. In this way, it is considered an "active" tech because it requires an action. The industry has perfected "passive" technology that has the same capabilities as interlock technology but doesn't require an action on the part of the driver. Therefore it is "passive." This technology consists of tubes installed in the steering wheel which sucks in the breath of the driver and analyzes it for alcohol content. This tech is not currently installed on any vehicles, but we have been told it is production-ready. If mandated on all cars, industry sources say that it will cost about \$100/vehicle. The BAC of the man who killed my family was four times the illegal limit. This technology would have stopped him. My family—five beautiful souls—would still be here.

We have the tools and technology to change the world, and we also have public support. It's time to ACT. Americans support Congressional action to require drunk driving prevention technology as standard equipment in all new vehicles, according to a new nationwide poll conducted by Ipsos for MADD. The survey found that 9 of 10 Americans support technology that is integrated into a car's electronics to prevent drunk driving (89 percent say it is a good or very good idea), while 3 of 4 (77 percent) back Congressional action to require this technology in all new vehicles. More broadly, 8 of 10 (83 percent) believe that new auto safety features should be standard in vehicles as they become available, not part of optional equipment packages.

#### **Equity and Enforcement: Technology Is Part of the Solution**

As we examine the auto industry's tremendous technological capabilities, I'd like to take a moment to recognize what's happening in our Nation with law enforcement and communities of color. And how technology solutions can also play a role in reducing the role of implicit bias in traffic enforcement. As a woman of color, I am very sensitive to the challenging issues that lay before us as a nation. Systemic racism impacts every facet of life for people of color, and traffic safety enforcement is no exception. MADD recognizes the need for traffic safety enforcement reform and we want to be a part of real solutions. We are committed to finding short-term, medium-term and long-term solutions to prevent enforcement practices that unjustly target black and brown people.

We are better positioned today than ever before to eliminate risk posed by drunk drivers in an equitable manner by using technology. While advancing fair and just traffic safety enforcement remains vital and urgent, advanced drunk driving preven-

tion technology does not notice a person's race or ethnicity. Impairment prevention technology has no implicit bias.

In addition to saving lives, these innovative technologies could reduce the need for traffic safety enforcement. MADD believes that fair and just traffic safety enforcement is crucial, and we have been saddened and outraged by the killing of unarmed Black men by police. We look forward to working with the Committee through the reauthorization of NHTSA's programs, with the goal of promoting best practices, and encouraging reform.

**The Beginning of the End of Drunk Driving**

Thank you for allowing me the opportunity to testify on this important issue. Your leadership and the leadership of this committee is to be commended. We can work together to save thousands of lives every year.

For 40 years, MADD has given a voice to millions of crash victims and their families. We have taken our collective pain and turned it into action, with the goal of no more victims. We have made tremendous progress, reducing drunk driving deaths by over 52 percent. But this isn't good enough.

I am here today, in honor of my family, hoping to continue the work to which my baby sister committed her life: saving lives. Rima was a formidable force. She was my hero. But even heroes—especially heroes—hurt from the pain that they witness. Very few were fortunate enough to know the vulnerable side of Rima. She maintained a fierce and stoic facade, and she took very seriously the fact that her strength is what everyone, including her family, relied on. It was her practice to phone me on her drives home from a difficult day at work; especially on the days she would have had to diagnose a patient with a terminal illness or, worse yet, when she had lost a patient. It was ALWAYS personal to her. During those conversations, she would unpack her pain with me. It was her way of seeking help to carry it, so that she could be what her family needed her to be by the time she had made it home. Today, I speak before you, in my humble attempt to continue my promise to unpack, and carry, and help heal for Rima.

My family should not have died. If Congress and the auto industry can get technology into vehicles that can keep drunk people from driving, we can make sure that others don't ever have to experience the horror that we did on January 6, 2019.

Let us prevent further tragedies before they come home for many others. The opportunity to save lives is not only afforded to those, like Rima, who choose the noble profession of medicine. It is an opportunity we ALL have, and it is within immediate reach. I look forward to working with the Members of this respected Committee to save 10,000 lives a year by passing S. 1331, the RIDE Act. I hope you will join Senators Lujan and Scott in moving this forward. Thank you.

Senator PETERS. Thank you, Rana. Thank you for your powerful testimony and your courage and please know, I think I speak for all of us here, you're in our thoughts and prayers.

Our second witness is John Bozzella, President and CEO of the Alliance for Automotive Innovation.

Mr. Bozzella is a veteran of the auto industry, who spent time as an executive at multiple companies before joining the Alliance for Automotive Innovation and its predecessor organization in 2014.

Mr. Bozzella's organization is also known as Auto Innovators and represents companies that collectively produce almost all cars and light trucks sold in the United States and who together employ millions of Americans.

Welcome and you may proceed with your 5 minute opening remarks, Mr. Bozzella.

**STATEMENT OF JOHN BOZZELLA, PRESIDENT AND CEO,  
ALLIANCE FOR AUTOMOTIVE INNOVATION**

Mr. BOZZELLA. Chairman Peters, Ranking Member Fischer, and Distinguished Members of the Committee, on behalf of the members of the Alliance for Automotive Innovation, thank you for the opportunity to appear today to discuss how the American auto in-

dustry is driving innovation toward a cleaner, safer, smarter future for personal mobility.

Today, we stand on the cusp of a transformative moment for the industry. Through substantial long-term investments in electrification and advanced safety technologies, including automation, the industry is poised to redefine motor vehicle transportation.

Maintaining and enhancing U.S. innovation leadership, however, is not just about the auto industry and its future. It's about the Nation's global competitiveness and economic security.

Nations that choose to lead the development and adoption of innovative technologies will potentially shape every aspect of transportation from supply chains to the global marketplace.

Across the globe, nations are backing bold commitments with government support. China has established itself in the EV battery supply chain and is moving aggressively to lead in safety technology advancements. Likewise, Europe is developing its own battery supply chains.

A failure to encourage advanced vehicle technologies in the U.S. presents long-term risks to the U.S. economy and its workforce.

My submitted testimony highlights four key areas that I believe hold the greatest promise for modernizing and transforming government policies and programs to unlock significant American innovation. These are supply chain resilience, electrification, vehicle automation, and enhanced safety technology development.

It's clear this committee understands expanding and securing industrial supply chains, including semi-conductors, is a key factor in whether the U.S. will control its economic aspirations.

Developing new supply chains with additional investment from the government and industry will also assist the adoption of electric vehicles.

Today, I would also like to focus on opportunities for vehicle automation and advanced safety technology. Automated vehicles have the potential to increase roadway safety, provide increased mobility for older adults and people with disabilities, and reduce traffic congestion and emissions.

Last year, we released the AV Roadmap, which includes 14 recommendations that can be implemented by Federal policymakers to guide AV development and deployment, preserving U.S. leadership in this important technology.

Technology and innovation create new opportunities to address critical issues. We have just heard today of unimaginable loss that befell Ms. Abbas Taylor's family. I can't imagine it. It could have happened to any one of us.

Innovative technologies offer real opportunities to address drunk driving and we look forward to working with MADD and policymakers to help eliminate this tragedy.

If the U.S. is to remain a global leader in automotive safety innovation, our policies and programs must keep pace. Earlier this month, we released the plan to advance safety at the speed of innovation, outlining our vision for a 21st Century new car assessment program, including five recommendations to provide meaningful information for consumers.

Our plan encourages an immediate kick start that would incorporate five proven crash avoidance technologies into NCAP.

In addition, today, I am proud to announce new safety principles to proactively address driver monitoring systems for Level 2 vehicles in which both lane centering and adaptive cruise control are simultaneously engaged. Through these principles, automakers representing nearly 99 percent of new vehicles sold in the United States have made a clear and public statement on the importance of effective driver monitoring and preserving the life-saving potential of Level 2 automated systems.

The principles focus on driver monitoring to determine or infer when a driver is not paying sufficient attention to the driving environment. The principles address consumer information. Driver monitoring is a standard feature for Level 2 systems, driver warnings, re-engaging the driver, misuse and abuse, and camera-based systems. They incorporate important recommendations from the Insurance Institute for Highway Safety, Consumer Reports, the NTSB, and Euro NCAP.

While the auto industry has long been an economic engine for the Nation and it is poised to remain the bedrock of U.S. innovation and manufacturing, we cannot be complacent. For the millions of workers depending on our industry for their livelihoods, we must seize this window of opportunity.

We look forward to working with you both, with the Committee, Members of Congress and the Administration.

Thank you.

[The prepared statement of Mr. Bozzella follows:]

PREPARED STATEMENT OF JOHN BOZZELLA, PRESIDENT AND CEO,  
ALLIANCE FOR AUTOMOTIVE INNOVATION

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 today to share my perspective on how the auto industry in the U.S. is driving innovation toward a cleaner, safer, and smarter future for personal mobility.

The Alliance for Automotive Innovation was formed last year to serve as the singular, authoritative, and respected voice of the automotive industry in the United States. Our 17 manufacturer members produce nearly 99 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.<sup>1</sup> We account for nearly six percent of our country's gross domestic product and represent our country's largest manufacturing sector.<sup>2</sup>

Today, we stand on the cusp of a transformative moment for the automotive industry in the United States. Through substantial, long-term investments in electrification,<sup>3</sup> as well as advanced safety technologies, including automation, the industry is poised to redefine motor vehicle transportation for decades. Likewise, government policies, investments and programs must be modernized and transformed to reflect changes in the global marketplace.

The industry's commitment to leadership comes at a unique and challenging time as the auto industry—and the nation—navigates near-and long-term uncertainty

<sup>1</sup>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.

<sup>2</sup>*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

<sup>3</sup>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.



due to the ongoing COVID-19 public health emergency. This time last year, for the first time since World War II, all motor vehicle manufacturing in North America ground to a halt for eight weeks and vehicle sales plummeted over 50 percent. Amid the turmoil, Auto Innovators' members continued innovating, putting decades of experience in precision manufacturing, supply networks, logistics, and purchasing to work in helping combat the public health emergency. As vehicle production resumed, that same innovative spirit helped the industry mitigate the combined hit to production and the workforce and rebound far more quickly than many predicted, with overall sales 15 percent lower than in 2019.

Despite the industry's resiliency over the past year, there is no question that lingering uncertainties associated with the ongoing public health emergency, including supply chain stresses and consumer trends, will strain the capital resources necessary to invest in future technology development. While our commitment to a cleaner, safer, smarter future is unwavering, the pathway to realizing that vision will be far more challenging.

Maintaining and enhancing U.S. leadership in 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 technologies, such as electrification, connectivity, and automation, will also shape supply chains, define global standards and, potentially, reshape the international marketplace.*

I believe that Senators in both parties understand this reality. Expanding and securing existing supply chains, while developing new ones, is a key factor in whether the U.S. will remain a leader in innovation. Our industry is currently facing a semiconductor shortage that has forced several automakers to halt production and cancel shifts in the U.S., with serious consequences for their workers and the communities in which they operate. In fact, this semiconductor shortage could result in the lost production of as many as 1.3 million vehicles in the U.S. this year alone. The current supply chain crisis has exposed overall capacity limits in the development and manufacturing of these chips and has also revealed significant risks in the current automotive semiconductor supply chain. There is an undeniable need to expand semiconductor capacity in the U.S. to meet the growing demand within the auto industry, as well as other sectors across the economy. This Committee and the Administration have shown tremendous leadership in addressing the semiconductor shortage, but Congress can also take action on policies that would incentivize this additional capacity in the U.S. Auto Innovators recently sent a letter to congressional leaders supporting full funding for programs based on the bipartisan CHIPS for America Act authorized in the FY 2021 National Defense Authorization Act which would increase the resiliency of automotive supply chains through the construction of new facilities that produce, or have the ability to produce, automotive grade chips.

New foundries, however, take years to build, and Congress can also support policies that facilitate increased chip capacity in the mid-term. In that same letter, we also called for the enactment of a semiconductor manufacturing investment tax incentive. Such an incentive can help companies offset the cost of creating new lines within existing facilities or reallocating current production to meet evolving needs.

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. to remain a leader in the development and adoption of transformational 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 Na-

tion'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 Auto 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, which are outlined below, to highlight critical technologies and the importance of a predictable policy environment to preserve and enhance U.S. leadership.

#### **The AV Policy Roadmap:**

Automated Vehicles (AVs) have the potential 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 last year 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 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.

I agree with what Secretary Buttigieg said during his confirmation hearing before this

Committee, “. . . automated vehicle technology is coming, its advancing very quickly, it is something that holds a potential to be transformative and I think in many ways policy has not kept up.” Indeed, it is past time to create a framework for the development and safe deployment of autonomous vehicle technologies that will unlock their tremendous potential in the U.S. It is our hope that this AV roadmap will help guide and prioritize policy development over the next few years to drive further safety innovation in this space and transform personal mobility.

#### **Innovating for a Safer Future:**

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. Unfortunately, the program has not been updated since 2011 and has failed to keep pace with innovations in crash avoidance technologies.

NCAP modernization is long overdue. If the U.S. is to remain a global leader in automotive safety innovation, our policies and programs must keep pace. 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 week, 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 lifesaving 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.

#### **The Safety Spectrum:**

While there are many opportunities for the U.S. to enhance its leadership in automotive safety, the world is not waiting for the U.S. to lead the way on automotive safety. In fact, in some areas, the U.S. is taking a step back while our global competitors are moving forward with purpose. This is no more evident than in our approach to vehicle connectivity and communication. Around the world, nations are working aggressively to expand testing, development, and deployment of vehicle-to-vehicle and vehicle-to-infrastructure communications (collectively, V2X) technologies. Last year, however, the Federal Communications Commission (FCC) voted to reallocate 45 MHz of the 5.9 GHz spectrum band for use by unlicensed devices. This decision reduced—by more than 50 percent—the spectrum available for V2X technologies. This reduction in spectrum means that critical life-saving applications, including some that would support automated vehicles, are no longer possible in the U.S. Further, the FCC's order has failed to adequately address harmful interference to safety applications in the remaining 30 MHz created by the use of unlicensed devices in the lower 45 MHz. This is a serious concern to Auto Innovators, State DOTs, and road users across the country.

#### **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.

Automakers will invest \$250 billion globally in vehicle electrification by 2023, and IHS Markit predicts there will be 130 EV models available in the U.S. by 2026. However, even with the collective efforts of the public and private sectors, of the 278 million light-duty vehicles currently registered in the U.S., only a fraction—approximately 1.7 million—are EVs, which include plug-in hybrid, battery, and fuel cell electric vehicles. And despite growing consumer interest and more than 50 EV models available today, EVs only made up about two percent, or roughly 300,000, of the 14.5 million new vehicle sales last year. A comprehensive approach is needed to incentivize wider-scale EV adoption through three key areas: Consumer affordability and awareness; Infrastructure build out; and Innovation, Manufacturing and Supply Chain development.

Ensuring greater consumer acceptance of EVs means addressing three key barriers to adoption in "cost parity," "convenience parity," and consumer awareness. While the auto sector has made significant progress driving down battery and fuel cell costs, further research and development investments, along with consumer incentives, will be crucial in bringing greater price parity between EVs and their internal combustion counterparts. We can address "convenience parity" by ensuring access to abundant electric charging and hydrogen fueling infrastructure. Both public and private stakeholders must work together on public policy efforts, such as Federal tax incentives, grants, rebates, and other mechanisms to spur significant charging infrastructure development in three key areas: homes (both single-family and multi-unit dwellings), workplaces, and highways and other public locations. Similar Federal investments and incentives should also be made available to rapidly build out hydrogen refueling infrastructure in the U.S. While these are just a few examples, additional demand-side policies, like building codes, public and private fleet purchase requirements, and a clean fuels policy that reduces carbon emissions while providing resources for charging and hydrogen refueling infrastructure are also critical to supporting additional growth of the EV market in the U.S.

While demand-side solutions aimed at addressing consumer and infrastructure barriers can help address near-term challenges, they will contribute to sustained

U.S. leadership in automotive innovation only if they are aligned with supply-side realities. In fact, the supply side represents one of the best opportunities to develop long-term and sustainable U.S. leadership through manufacturing investments. 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 for both R&D and manufacturing, expanding programs such as the Advanced Technology Vehicles Manufacturing (ATVM) loan program to further encourage domestic manufacturing of EVs, and critical components like batteries and semiconductors, will be key factors that drive automotive innovation in the United States for generations to come.

### Conclusion:

Globally, the automotive industry annually invests more than \$125 billion in R&D, \$20 billion more than the software and Internet technology industry.<sup>4</sup> Roughly \$26 billion of this annual investment occurs in the U.S., which supports 110,000 jobs and harnesses the innovation and ingenuity of major automakers and their workforce.<sup>5</sup>

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 longterm risks to U.S. competitiveness and economic security.

For the millions of workers depending on the auto industry for their livelihoods, we must seize this window of opportunity. Working collaboratively to develop a coherent, national approach to automotive innovation opens the door to endless possibilities and avoids the unintended consequences of focusing on narrow policy objectives. For example, technology mandates without complementary supply side investments risk eroding the U.S. manufacturing base for innovative technologies. 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. Fortunately, we have an opportunity to avoid those outcomes and recently we sent a letter to the Administration and Congress to outline such a comprehensive policy<sup>6</sup>.

The auto industry has long been an economic engine for the nation, and it 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. 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.

On behalf of Auto Innovators and our member companies, I look forward to working with both Congress and the Administration to effectuate 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.

<sup>4</sup> 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](https://www.strategyand.pwc.com/gx/en/insights/innovation1000.html?utm_campaign=sbpwc&utm_medium=site&utm_source=articletext)

<sup>5</sup> National Science Foundation, Info Brief, "U.S. Businesses Reported \$441 Billion For R&D Performance In The United States During 2018, A 10.2% Increase From 2017," Accessed 11/2/2020

<sup>6</sup> "Auto Industry EV Policy Letter to President Biden", <https://www.autosinnovate.org/posts/communications/Auto%20Industry%20EV%20Policy%20Letter%20to%20President%20Biden%20March%202029%202021.pdf>



## LEVEL 2 DRIVER MONITORING PRINCIPLES

Level 2 features provide a benefit to the driver by assisting with the driving task and reducing the potential for human error that could result in a crash. However, these systems are not designed to operate independent of the human driver – the driver is ultimately responsible for the driving task. For purposes of this document, Level 2 refers to those automated driving assist features where both lane centering and Adaptive Cruise Control (ACC) are simultaneously engaged.

Confusion among some consumers regarding their role as a driver of some vehicles equipped with a Level 2 system has resulted in driver complacency, misuse or abuse of Level 2 systems that has, in some cases, resulted in a crash. To help address this concern, the automotive industry has developed vehicle driver monitoring systems that use sensor-based technologies to determine or infer when a driver is not paying sufficient attention to the driving environment. Automakers may choose, based on the specific attributes of a vehicle's Level 2 system, to use sensing methods that rely on torque or capacitive sensors or to use camera-based methods.<sup>1</sup>

There is extensive, ongoing research in the area of driver monitoring. While this important work continues, the Alliance for Automotive Innovation puts forward the following principles to help address important safety aspects for driver monitoring systems for vehicles with Level 2 systems.

### Consumer Information

The Level 2 system name should reasonably reflect the functionality of that Level 2 system and not imply greater capability. The Level 2 system information, including promotional materials, should reasonably reflect the functionality of the system. This may include (but is not necessarily limited to): any Level 2 specific capabilities or limitations, the responsibility of the driver, the Operational Design Domain<sup>2</sup>, and whether or not the driver's performance of one or more of the driving tasks while the Level 2 system is engaged (within its Operational Design Domain) results in the disengagement of the system. The Level 2 system should, at all times, convey information to the driver on the status of the system such that a driver can reasonably discern whether the Level 2 system is engaged or disengaged.

<sup>1</sup> These examples are included to illustrate the variety of current sensing methods and are not intended to be a comprehensive list, particularly as new methods and technologies may be introduced in the future.

<sup>2</sup> Operating conditions under which a given driving automation system or feature thereof is specifically designed to function, including, but not limited to, environmental, geographical, and time-of-day restrictions, and/or the requisite presence or absence of certain traffic or roadway characteristics.



#### Driver Monitoring as a Standard Feature

A driver monitoring system should be provided as a standard feature in any vehicle that is equipped with a Level 2 system in which both lane centering and ACC can be simultaneously engaged. The driver monitoring system should be active when the Level 2 feature is engaged. Since it is important that the driver of a Level 2 vehicle be attentive to the surrounding driving environment at all times, the driver monitoring system should be designed such that the driver monitoring system cannot be disengaged or disabled while the Level 2 feature is engaged.

#### Driver Warnings

If a driver monitoring system determines or infers that the driver is not engaged in the driving task, then an initial warning should be issued within a reasonable amount of time from when a system detects the driver is not engaged. For example, for a vehicle equipped with a Level 2 system that is designed to be “hands on,” if the driver does not satisfy the system’s “hands on” criteria, the driver monitoring system should issue an initial warning, i.e., request for the driver to re-engage in the driving task. The time elapsed between the detection of the disengaged driver to the request for that driver to re-engage should be minimized. If the driver does not respond to the initial warning from the driver monitoring system, subsequent warnings should escalate and include, at a minimum, some combination of visual and non-visual (auditory or haptic) alerts.

#### Re-engaging the Driver

The driver monitoring system should only terminate the warning(s) if the system detects that the driver has appropriately re-engaged based on the system design, for example by putting his or her hands back on the wheel or returning his or her eyes to the road. If the driver does not respond to the escalated warnings from the driver monitoring system, the vehicle should take a corrective action, such as disengaging the Level 2 system, increasing the ACC headway distance, or coming to a safe stop. Any such action should include a clear combination of visual and audible alerts regarding the status of the system and vehicle.

#### Misuse and Abuse

The potential for driver misuse or abuse of a system should be evaluated as part of the design process for driver monitoring systems.

#### Camera-Based Systems

An in-vehicle camera should be further considered as a component of a driver monitoring system for vehicles with Level 2 systems, particularly for more advanced Level 2 systems (such as those with hands-off capabilities) to help identify driver inattention. This consideration should be based upon, among other things, research by industry, academia, government or any combination and should take into account the uniqueness of each manufacturer’s vehicle systems.

Senator PETERS. Thank you, Mr. Bozzella, for your testimony.

We'll now hear from Ann Wilson with the Motor and Equipment Manufacturers Association, also known as MEMA, about the incredible small and medium businesses that power the auto industry's supply chain.

Ms. Wilson is the Senior Vice President of Government Affairs at MEMA and in that role Ms. Wilson works with MEMA to oversee Federal and state legislative and regulatory monitoring, reporting, and advocacy.

Ms. Wilson, welcome. You may proceed with your opening statement.

**STATEMENT OF ANN WILSON, SENIOR VICE PRESIDENT,  
MOTOR & EQUIPMENT MANUFACTURERS ASSOCIATION**

Ms. WILSON. Thank you. Good afternoon, Chairman Peters, Ranking Member Fischer, Members of the Subcommittee.

My name is Ann Wilson, and I serve as the Senior Vice President of Government Affairs for the Motor & Equipment Manufacturers Association or MEMA.

Thank you for today's invitation to provide our views on the opportunities and challenges facing the auto industry.

MEMA represents more than 1,000 vehicle suppliers that develop innovative technologies and manufacturer and remanufacture original equipment and after market components and systems for use in passenger cars and commercial trucks.

The industry operates in all 50 states and directly employs almost one million Americans and is the largest sector of manufacturing jobs in this country.

There's no doubt that a vibrant auto industry can provide this country with opportunities to lead in technology development, safety, environment, and employment, but we have many challenges ahead.

First regarding technology development and readiness, over the past 5 years, the European Union, Japan, Korea, and China have moved forward championing the adoption and deployment of new vehicle electrification, advanced driver assistance systems, and automated technologies. The U.S. is in danger of losing our competitive edge due to a lack of clear national policies. Infrastructure legislation can provide that clarity.

In addition, since the end of 2020, the U.S. vehicle industry has faced a significant supply chain crisis. Although the shortage of semiconductors has been the focus of this crisis, the issues are more widespread, include semiconductors, resins, foam, rubber, and steel, as well as delays in our Nation's ports.

The current crisis reinforces the need to build more robust and steady global supply chains. These supply chains must focus on both domestic production and global availability. This is why the Endless Frontiers legislation is so important.

MEMA also supports funding for the CHIPS Act as a way to address long-term challenges in the semiconductor industry while addressing the needs of additional capacity to produce motor vehicle grade chips.

Next, I'd like to shift to vehicle safety. As the Committee has already recognized, in 2019, we did indeed lose over 36,000 Ameri-

cans in vehicle crashes in the United States. Preliminary data, as Senator Fischer indicated, for the first 9 months of 2020 show that unfortunately the fatality figures are climbing, despite a downturn in vehicle miles traveled.

MEMA believes greater deployment of crash avoidance technology, such as automatic emergency braking, lane-keeping, and blind spot detection, will improve overall motor vehicle fatalities. We believe an immediate upgrade to the New Car Assessment Program or NCAP is the most important first step in addressing this.

The U.S. NCAP is a voluntary program and provides consumers with information regarding performance and equipment in new vehicles. The current program rates a vehicle's crashworthiness but does not fully address crash avoidance.

MEMA urges Congress to require NHTSA to immediately implement a substantive and comprehensive update of the NCAP by adding crash avoidance and mitigation technologies and creating a roadmap for future technologies.

Next, I'd like to talk about fuel economy and vehicle emissions. MEMA is committed to working with you toward a net zero carbon transportation future that includes the shift to electric drive vehicles.

For the U.S. to be a leader in this transformation, we must work collaboratively to develop a comprehensive national vision and strategy to meet our goals, but to get to this goal, we must commit to a level of investment that we have rarely seen as a country. This includes investment in infrastructure, R&D, and retooling as well as consumer incentives.

In addition, we must provide for continued investment in reaching the full efficiency potential of the internal combustion engine. We also must allow for greater use of hybrid, plug-in hybrid, battery electric, and hydrogen fuel cell vehicles and provide the infrastructure for their usage, and a fully electric vehicle fleet will require significantly fewer supplier jobs with some experts arguing the supplier industry could lose up to 30 percent of their traditional workforce. Retooling of existing facilities and workforce up-skilling will be necessary.

And, finally, I would like to talk about workforce. Workforce development is one of the most significant challenges facing our industry. Our industry's workforce needs are evolving with the push to vehicle electrification and automation.

In response to these changes, workforce development, apprenticeship, and up-skilling programs must advance to continue providing U.S. workers with the necessary skills to manufacture and service new technologies.

Thank you for your attention, and I look forward to your questions.

[The prepared statement of Ms. Wilson follows:]

PREPARED STATEMENT OF ANN WILSON, SENIOR VICE PRESIDENT,  
MOTOR & EQUIPMENT MANUFACTURERS ASSOCIATION

### **Introduction**

MEMA represents more than 1,000 vehicle suppliers that develop innovative technologies and manufacture and remanufacture original equipment (OE) and



aftermarket components and systems for use in passenger cars and heavy trucks.<sup>1</sup> This industry operates in all 50 states, directly employs almost one million Americans, and is the largest sector of manufacturing jobs in the United States. Direct, indirect, and induced vehicle supplier employment accounts for over 4.8 million U.S. jobs. Moreover, vehicle suppliers contribute 2.5 percent of U.S. GDP. The average U.S. wage for direct vehicle supplier jobs reached \$80,300—exceeding the average of all U.S. manufacturing sectors.<sup>2</sup>

Across the entire range of new vehicle innovation—from automated to zero-emission technologies—vehicle suppliers are leading the way. Vehicle suppliers conceive, design, and manufacture the OE components and technologies that make up more than 77 percent of the value in new vehicles. Vehicle suppliers also manufacture aftermarket parts and materials for the maintenance and repair of over 290 million vehicles on the road.

MEMA supports infrastructure legislation that accelerates the development, commercialization, manufacture, and deployment of new, advanced technologies in the United States.<sup>3</sup> This includes the more rapid deployment of the critical building-block technologies needed to reach the targets for electrified and automated vehicles. The promotion of technology development will allow the U.S. to be more innovative and globally competitive and to lead the world on the path of enhanced mobility for all citizens.

MEMA members have long led in developing innovative vehicle technologies that save lives, improve efficiencies, and reduce emissions. We believe infrastructure legislation must be part of an overall comprehensive, strategic, and meaningful plan to prepare the U.S. for a technologically advanced transportation future. For too long, the U.S. has not moved forward at an adequate pace to accommodate and prepare our Nation for these advanced technologies in a concerted, dedicated, and clear fashion.

The vehicle industry has long product cycles; suppliers must plan for components and systems ahead of the curve and well in advance of deployment. Vehicle suppliers and our customers are being encouraged by policymakers to design, develop, and deploy these technologies in the U.S. and require a more substantive framework within which we can innovate and create jobs. While there is an array of guidelines, best practices, voluntary agreements, and incomplete or shelved rulemakings, a more structured, coordinated policy framework is critical to abating the uncertainty that persists in the U.S. There are other regions in the world that are closing these gaps. A structured roadmap is needed in order to keep our country on the leading edge as a manufacturing and innovation center and to provide Americans with greater mobility, safety, and environmental benefits. Yet, this vision is not without challenges.

MEMA believes we must focus on five fundamentals:

1. *Advanced Technology Readiness and Competitiveness*—The U.S. must provide the tools for our manufacturers to compete globally for technology development and deployment. Our country has a strong foundation to be the global leader in creating new innovative, forward-leaning technology, including automated and electric vehicles. This leadership will require significant investments and incentives with an established roadmap.
2. *Infrastructure*—An infrastructure package must address motor vehicle safety. With an increasing level of U.S. motor vehicle fatalities, Congress must take this opportunity to provide the impetus and attack this issue. MEMA strongly supports implementing a substantive update of the U.S. New Car Assessment Program (NCAP). The timeline to update the program can be done in a shorter period, encourage deployment, and provide consumers with more comparable information, particularly about the benefits of crash avoidance technologies. Updating NCAP will also help the U.S. keep pace with other global regions in technological advancements. In addition, MEMA supports improving our Nation's infrastructure to prepare the U.S. for future mobility, including automated and electric vehicles.

<sup>1</sup>MEMA represents its member companies through its four divisions: Automotive Aftermarket Suppliers Association (AASA); Heavy Duty Manufacturers Association (HDMA); MERA—The Association for Sustainable Manufacturing; and Original Equipment Suppliers Association (OESA).

<sup>2</sup>*U.S. Labor and Economic Impact of Vehicle Supplier Industry*, MEMA and IHS Markit. February 2021.

<sup>3</sup>MEMA will provide this committee with additional views on the commercial vehicles and freight transportation.

3. *Fuel Efficiency and Emissions*—MEMA supports a path to a net-zero carbon transportation system including electrification. This path must allow for multiple technologies including increased efficiency of internal combustion engines, hybrid, plug-in hybrid, battery-electric, and hydrogen fuel cell vehicles during this transition.
4. *Equity in Mobility and Service*—MEMA believes we must address the issue of equity in mobility and vehicle service. Automated vehicles (AVs) have the potential to enhance the mobility of people in a variety of ways by providing more options. For those many Americans that depend on a used vehicle for transportation to work, school, and daily life, vehicles are increasingly more durable and last longer because of advancements in vehicle technology. With the average age of passenger vehicles exceeding 12 years, there must be a focus on assuring Americans that their vehicles can provide the greatest degree of safety and fuel efficiency possible with regular obtainable maintenance service.
5. *Workforce*—Workforce development is one of the most significant challenges facing the industry. Our industry’s workforce needs are evolving with the push to vehicle electrification and automation. In response to these changing needs, worker development and upskilling programs must advance to continue providing U.S. workers with the necessary skills to manufacture and service new technologies. The industry will require a diverse workforce with occupations across many industries with varying levels of education, training, and experience. Most of these occupations will require specialized training or work experience.

#### **Advanced Technology Readiness and Competitiveness**

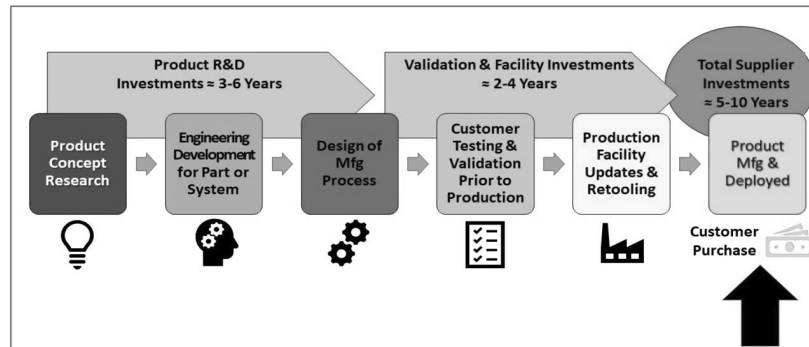
The domestic motor vehicle industry is at a crossroads. Over the last five years, other countries have moved forward aggressively adopting, promoting, and mandating vehicle electrification, advanced driver-assistance (ADAS) systems, and automated technologies, threatening the leadership position of the United States.

In short, the U.S. is currently without a comprehensive and definitive plan. We must adequately prepare and accommodate for not only the advanced vehicle technologies of today but the future transportation landscape of tomorrow. While the vehicle industry is always looking ahead and planning a range of vehicle technologies on a wide range of vehicle platforms, the uncertainty of the U.S. market can inhibit or discourage domestic development and deployment of technologies. Over the past decade, the National Highway Traffic Safety Administration (NHTSA) has lost forward momentum; there is a lack of definitive action by the agency on multiple fronts that has caused the U.S. to fall behind our global counterparts. While the European Union, Japan, Korea, and China move forward championing these endeavors, the U.S. is in danger of losing our competitive edge due to a lack of clear national policies.

Global companies have a choice of where to grow their businesses and where to invest in the research, development, and manufacturing of new products. Companies choose new facility locations based on complex analysis including customers and suppliers, consumer markets, workforce capabilities, tax and regulatory policies, direct government incentives, workforce capabilities, and export potential. However, the reality is that vehicle suppliers are unlikely to invest in the production of advanced components in the U.S. unless there is strong regional demand for those technologies. If the demand is centered in European or Asian regions, then that development and manufacturing will be localized there.

In addition, suppliers depend on policy certainty in order to direct investment. Suppliers assume a leading role in developing technology solutions for motor vehicles and take on the associated risks of developing these technological advancements. In some cases, these investments are necessary to comply with Federal and state standards that lower emissions or increase safety. In others, the investments are made because consumers and the industry are seeking to address the same challenges. The development of these advanced technologies requires substantial lead-time, major economic resources, and product planning that includes several stages. Importantly, suppliers do not get return on their capital investment until these technologies are deployed (see graphic below). The return on investment is estimated very carefully and amortized over several years. Therefore, policy certainty has enormous implications on the motor vehicle supplier industry. Definitive action by NHTSA and Congress will help provides the industry the needed certainty to develop and improve future products and systems.

### Motor Vehicle Parts Suppliers Product Planning and Investments Timeframe



For the U.S. to remain a leader in innovative technological advancements, we require a competitive environment with access to skilled and educated workers, raw materials, financing, and transportation logistics. Suppliers rely on legislative and regulatory certainty to achieve steady progress toward sustainable objectives. Policies must be in place for the U.S. to continue leading in the race to develop and manufacture these innovations domestically or our Nation's manufacturing and employment bases will ultimately suffer.

Finally, infrastructure legislation must be part of an overall comprehensive, strategic, and meaningful plan to prepare the U.S. for a technologically advanced transportation future. It must provide policy certainty such that advanced vehicle technologies—both safety and environmental—will have a clear and direct pathway to deployment that does not create unnecessary financial and regulatory burdens and avoids stranded domestic investments. Research and development coordination, tax incentives, and Federal support will provide greater progress than stringent or inflexible mandates. However, policy certainty does not necessitate the mandate of a single technological path. MEMA will work diligently with the Biden Administration and Congress to ensure that infrastructure legislation positively addresses each of these concerns.

#### *Supply Chain Crisis*

Since the end of 2020, the U.S. vehicle industry has faced a significant supply chain crisis. Although the shortage of semiconductors has been the focus of this crisis, the issues are more widespread (semiconductors, resins, foam, rubber, steel, and many other materials and components), as well as delays at our Nation's ports. These shortages and delays lead to price increases on motor vehicle part inputs, cutting profits and funds available for research and development and other long-term priorities.

Due to these supply chain-induced shortages, the industry is anticipating an overall decline in motor vehicle production for the first three quarters of 2021 with adverse employment impacts, both for vehicle manufacturers and vehicle parts manufacturers. One of our smaller supplier members reported that the port crisis alone is costing their company more than \$500,000 a month in shipping costs. These shortages are diverting capital that cannot be used now to meet the demands of our industry's changing landscape.

The current crisis reinforces the need to build more robust and steady global supply chains. These supply chains must focus on both domestic production and global availability. Over time, the U.S. must create greater sourcing of critical components and technologies for the domestic market. Additional sourcing from allies will also be helpful. Increasing and diversifying supplies of components and materials around the globe, including in the U.S., are vital to domestic motor vehicle parts manufacturers.

MEMA supports two key goals to enhance global supply chain competitiveness. The first is to develop and enhance the domestic capability to produce cutting-edge technology. Additionally, it is vital to ensure supply chain resiliency that will support America's current manufacturing jobs as well as economic and national security. This will create a robust supply of critical established technology, including legacy chips. To that end, MEMA supports funding for the CHIPS Act and further appropriations for the necessary additional capacity to produce motor vehicle grade chips.

## Infrastructure

Surface transportation bills have long focused on the infrastructure needs of this country. Our industry relies on a robust infrastructure system of roads, bridges, and ports, but infrastructure needs are changing as motor vehicles are transforming. Congress must pass legislation that keeps pace with these needs.

This means that we must deploy charging stations, including public DC fast charging stations, at the rate of the expected adoption of plug-in hybrids and electric vehicles. This must include a mix of options located at nonworkplace and nonresidential sites. Additionally, we must provide road markings and signage that improve the performance of advanced vehicle safety systems. All these programs will require a new level of investment to both maintain existing roadways and expand access for the transformative vehicles of the future.

### Vehicle Safety

Motor vehicle parts manufacturers are key developers of the components and software for the safety systems in today's vehicles. Suppliers are committed to improving vehicle safety and are leading the way in developing the technologies necessary to reduce fatalities and injuries. Our industry embraces the culture, innovation, and direction that is necessary to advance the goals to significantly reduce vehicle fatalities, injuries, and societal costs.

Recent complete crash data show that, in 2019, over 36,000 people lost their lives in vehicle crashes.<sup>4</sup> Preliminary Federal data for the first nine months of 2020 show that, unfortunately, the fatality figures are climbing despite a downturn in vehicle miles traveled.<sup>5</sup> The National Safety Council (NSC) recently estimated that over 42,000 Americans died in motor vehicle crashes in 2020.<sup>6</sup> This represents an 8 percent increase over 2019 and is the highest year-over-year increase that NSC has calculated in 96 years. In comparison, preliminary 2020 data from Europe show a significant drop in vehicle related fatalities, dropping 17 percent compared to 2019.<sup>7</sup> We should all be alarmed.

MEMA believes greater deployment of crash avoidance technologies such as automatic emergency braking (AEB), lane keeping, and blind spot detection will improve overall fatalities. Indeed, a study commissioned by MEMA and conducted by the Boston Consulting Group (BCG) in 2015 estimated that the U.S. could reduce fatalities on U.S. roads by 10,000 per year if all vehicles were equipped with a suite of advanced driver assistance (ADAS) technologies.<sup>8</sup>

Suppliers are the key innovators, developers, and manufacturers of these technologies. The evolution over the years has been transformational beginning with building-block passive systems to active, more automated systems. From anti-lock braking system (ABS) to electronic stability control (ESC), from forward collision and lane departure warning systems (FCW, LDW) to front and rear AEB systems and lane keeping assistance systems. These and other advanced vehicle safety systems, plus improvements in vehicle crashworthiness, are all technologies that help drivers avoid or mitigate crashes and drastically reduce fatalities, injuries, property damage claims, and societal costs.

An array of ADAS technologies is currently commercially available and is proven to have safety benefits. Europe, which is a tangible counterpart to the U.S., has demonstrated the safety benefits and successful deployments of these technologies. There are many advanced safety features available in the vehicle marketplace ranging from passive to active systems that either warn and/or intervene to avoid or mitigate vehicle crashes. These advanced technologies have foundational systems upon which the more complex systems are built. Over recent years, computing power and sensor technologies have rapidly evolved and improved. Many of these systems and components are available on a larger scale and offered on a broader array of vehicle price points.

<sup>4</sup>"Overview of Motor Vehicle Crashes in 2019," National Highway Traffic Safety Administration, Publication No. DOT HS 813 060, December 2020.

<sup>5</sup>"Early Estimate of Motor Vehicle Fatalities for the First 9 Months of 2020," National Highway Traffic Safety Administration, Publication No. DOT HS 813 053, December 2020.

<sup>6</sup>National Safety Council indicated their preliminary data show that as many as 42,060 people are estimated to have died in motor vehicle crashes in 2020 in its recent announcement "Motor Vehicle Deaths in 2020 Estimated to be Highest in 13 Years, Despite Dramatic Drops in Miles Driven," March 4, 2021.

<sup>7</sup>"Road safety: 4,000 fewer people lost their lives on EU roads in 2020 as death rate falls to all time low" European Commission, March 4, 2021.

<sup>8</sup>"A Roadmap to Safer Driving Through Advanced Driver Assistance Systems," MEMA and Boston Consulting Group, Sept. 29, 2015.

*U.S. New Car Assessment Program (NCAP)*

The U.S. NCAP is a voluntary program and provides consumers with information regarding the performance and equipment in new vehicles. The current program rates a vehicle's crashworthiness—in other words, how well it protects the vehicle's occupants in a crash. The NCAP is not keeping up with technology development and is not serving the American consumer well. It must be updated.

MEMA urges Congress to specifically direct NHTSA to update and modernize the NCAP. MEMA supported language in the FAST Act in 2015 that required NHTSA to include crash avoidance technology information on the Monroney Label. Although NHTSA has a substantial amount of data on the efficacy of these technologies, the agency never finalized the congressional mandate. The 2015 requirement is no longer sufficient to ensure that a consumer has enough information about crash avoidance technologies.

Instead, Congress should take additional steps to require NHTSA to plan for a substantive and comprehensive update of the NCAP. NHTSA should immediately update the NCAP by adding a list of pre-determined crash avoidance and mitigation technologies that will be considered when determining the rating of a specific vehicle. Regarding crash avoidance, several technologies are ripe for immediate inclusion and address common crash scenarios. Much of the technical work, research, and test procedures have already been completed for many of these currently available technologies. As such, there are several that can be immediately included as part of an initial update to the NCAP.

Therefore, NHTSA should be required to move forward quickly and finalize these new requirements without further delay. Equally important, NHTSA must establish a clear roadmap to allow for phased-in future updates by prescribed milestones, providing vital time and certainty needed for product development and planning of vehicle manufacturers and suppliers. These changes will assure NCAP keeps pace with new technologies and, more importantly, keep the U.S. on the leading edge of safety technology innovation.

*Vehicle-to-Everything (V2X) Technologies*

Vehicle suppliers are critical in the ongoing development and implementation of vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-pedestrian (V2P) technologies (collectively referred to as vehicle-to-everything, or V2X). V2X technologies are another innovation that promises to significantly increase transportation safety. These systems allow vehicles to communicate with other vehicles, infrastructure, law enforcement, and bicycle and pedestrian road users to avoid crashes, enhance safety, improve transportation efficiency, and reduce air pollution. NHTSA predicts that the safety applications enabled by V2X technologies could eliminate or mitigate the severity of up to 80 percent of non-impaired crashes, significantly reducing the nearly 37,000 lives lost and three million injuries that occur on U.S. roadways each year. V2X technologies will provide real economic savings as well by significantly reducing the more than \$800 billion in annual costs associated with crashes on American roads.

V2X technologies require dedicated spectrum to ensure uninterrupted high-speed communication; many years ago, the 5.9 GHz spectrum was allocated to intelligent transportation systems. Over the years, suppliers spent millions of dollars on research, development, and production of these technologies in anticipation of wide deployment. Suppliers have been directly engaged with the U.S. Department of Transportation (DOT), several state departments of transportation, regional and city agencies, and a host of industry stakeholders to support a wide array of deployment projects. All stakeholders have made significant investments in research, infrastructure, and planning in reliance on the 5.9 GHz spectrum band would be in place.

Unfortunately, the Federal Communications Commission (FCC) has recently voted to reallocate more than half of the spectrum in the 5.9 GHz band reserved for these technologies. Analysis suggests that this will not leave an adequate spectrum for many important V2X safety applications including V2P applications, which are designed to improve road safety for vulnerable road users such as pedestrians and cyclists. There also would not be adequate spectrum to deploy advanced safety applications that rely on Collective Perception Messages and Maneuver Coordination Messages, which support applications that will enhance the safety of automated vehicles.

Additionally, the potential for harmful interference from adjacent channels threatens the ability of V2X to function in the spectrum remaining. Numerous technical assessments related to the FCC's proposal, including preliminary assessments released by the DOT, show that out-of-channel interference from unlicensed devices operating in adjacent bands would be likely to make the spectrum reserved for transportation safety communications unusable for such purposes. This interference

would delay or block safety-critical messages where split-second action is required to avert a crash. MEMA agrees with the overwhelming consensus of the transportation safety community that this spectrum reallocation undermines transportation safety, and that all 75 MHz of the 5.9 GHz band should be preserved for V2X technologies.

#### *Automated Vehicles*

As the committee knows, 94 percent of motor vehicle crashes are the result of human error.<sup>9</sup> Legislation for AVs will go a long way to address this issue. Vehicle parts manufacturers are key developers of the components and software for automated driving systems (ADS) that enable AVs. As noted earlier, vehicle suppliers manufacture a wide range of ADAS technologies, as well as integrated active/passive safety systems, that lay the foundation for ADS-equipped AVs. MEMA strongly supports narrow, targeted AV legislation focused on creating a path forward for the development and deployment of ADS-equipped AVs and technologies for Levels 3–5 as identified by the SAE International Standard J3016. MEMA believes this can be done in a manner that protects the driving public while keeping pace with new and developing technologies. The AV START Act passed by the Committee during the 115th Congress would have been a first step to meeting these goals.

MEMA urges the Committee to act quickly this year to pass legislation that provides suppliers parity with the automakers on technology testing, affirming that motor vehicle equipment manufacturers can test and evaluate ADS on public roads. Suppliers are critical to the overall development and refinement of ADS technology. If suppliers are unable to carry out this work in an independent manner, then it will impede and delay the evolution of the critical systems, artificial intelligence, human-machine interface, and other advancements that are needed to bring the vision of automated vehicles to fruition.

MEMA continues to urge Congress to craft legislation that clarifies the distinction between Federal and state roles in regulating AVs. A patchwork of state requirements may impede testing, deployment, and operating ADS-equipped vehicles. The Federal government must have primary oversight over vehicle safety, with state and local governments regulating registration and licensing requirements.

Developing and evolving technologies for AVs will continue to remain ahead of government standards. To allow for this, MEMA recently recommended to NHTSA that the agency should create an ADS safety framework through the provision of guidelines, recommendations, and consumer information that are based on information and data that is currently available and take a technology-neutral approach.

At the same time, suppliers rely on clear, concise rulemakings that provide certainty as suppliers are developing and working to deploy advanced technologies. A clear path to deployment, including updating existing safety standards, is necessary, and NHTSA must continue working on translations from existing rules to allow for AV deployment. These translations, which include updating FMVSS standards that specify a person or driver, are necessary to allow for ADSs to be considered as “drivers and operators.” This will eliminate incompatible regulations to allow the development of AV technologies. NHTSA must continue the modification and development of FMVSS standards to support the development of AV technology. Suppliers remain part of the ongoing government-industry dialogue to address these complex issues.

#### **Fuel Efficiency and Emissions**

MEMA is committed to working toward a net-zero carbon transportation future that includes a shift to electric-drive vehicles. This vision is shared by automakers, workers, and suppliers and has brought the auto industry in the U.S. to a transformative moment, one that will shape a cleaner future and redefine motor vehicle transportation for generations to come.

For the U.S. to be a leader in this transformation, we must work collaboratively to develop a comprehensive national vision and strategy to meet these goals. This is not just about the future of the auto industry in the U.S., it is about our country’s race to innovation, global competitiveness, economic security, and the evolution of the U.S. workforce. Nations that lead the development and adoption of innovative technologies will also shape supply chains and job creation, define global standards and, potentially, reshape the international marketplace. However, neither the current rate of consumer adoption of EVs nor existing levels of Federal support for sup-

<sup>9</sup>“Critical Reasons for Crashes Investigated in the National Motor Vehicle Crash Causation Survey,” National Highway Traffic Safety Administration, Publication No. DOT HS 812 115, February 2015.

ply-and demand-side policies, is sufficient to meet our goal of a net-zero carbon transportation future.

For this reason, MEMA joined with the Alliance for Automotive Innovation and UAW in specifically defining the commitments that must be made to reach our common goals.<sup>10</sup> In short, to get to this goal we must commit to a level of investment that we have rarely seen as a country. This includes investment in infrastructure, R&D, and retooling as well as consumer incentives.

MEMA believes that regulatory requirements from the U.S. Environmental Protection Agency (EPA) and NHTSA must provide for continued investment in reaching the full efficiency potential of the internal combustion engine. This means vehicles purchased during the transition to full electrification will provide strong fuel efficiency and emissions reduction while working towards the net-zero carbon emission goal. These vehicles will likely be on the road for an additional 20 years, and our collective commitment to climate change will not be met unless the propulsion system containing the internal combustion engine continues to improve its efficiency through system optimization and electrification.

We must also allow for the greater use of hybrid, plug-in hybrid, battery electric, and hydrogen fuel cell vehicles and provide the infrastructure for their usage. This will help both manufacturers and consumers alike in the transition.

A fully electric vehicle fleet will require significantly fewer supplier jobs, with some experts arguing that the supplier industry could lose up to 30 percent of its traditional workforce. Engines, transmissions, aftertreatment systems, and other parts will simply not be manufactured for battery electric and fuel cell vehicles.

The supplier industry and the American workers need assistance and support in the forms of incentives to retool existing manufacturing facilities, economic development incentives, and programs that foster domestic investment. In addition, we must heavily invest in workforce up-skilling programs. Americans deserve an opportunity to secure meaningful skills that will carry them through their careers. This will take time, making the transition even more important.

#### **Equity in Mobility and Service**

For this testimony, MEMA is addressing equity in the broad context of mobility and vehicle service and maintenance.

As stated earlier, AVs have many anticipated benefits to open up and enhance the mobility of many citizens in a variety of ways and provide more options. The vehicle industry and beyond are looking at various pathways and opportunities that could be realized in the future. While it is unclear which services and applications will become part of our future transportation network, it is clear that it has the potential to get more people safely moving to their destinations.

Transformative, innovative vehicles should not only be available to the few. A robust, modern NCAP would provide our citizens with important vehicle safety information, no matter the size of their budget. In addition, we must provide electric charging opportunities in a wide range of locations to make ownership of new technologies feasible.

Many people depend on a used vehicle for transportation. Congress must recognize the role that the automotive aftermarket plays in providing affordable, reliable, and safe transportation to many Americans. The average cost of a new car now exceeds \$40,000, far beyond the ability of many Americans to afford. Indeed, used car sales in this country rose in the early months of the pandemic as many Americans were forced to look for transportation options and were unable to find an affordable new vehicle.

Vehicles are increasingly more durable and last longer; the average age of passenger vehicles now exceeds 12 years. That means that many Americans keep their vehicles for 20 years or more, and often these individuals will be the second, third, or even fourth owner of a car. Vehicle suppliers develop and manufacture the aftermarket parts and materials needed to maintain and service over 290 million vehicles on the road. Regular service intervals for not only older vehicles, but also newer vehicles with advanced technologies, are critical to maintaining vehicle safety, efficiency, emissions, and performance.

MEMA would encourage this Committee to consider the following:

- This is not the time to institute any fuel efficiency or emissions consumer incentive program that requires the destruction of a trade-in vehicle. These trade-

<sup>10</sup>*Joint Vehicle Industry Letter to President Biden re: Working Towards a Net-Zero Carbon Transportation Future*, from the Alliance for Automotive Innovation, MEMA, and UAW, March 29, 2021.

in vehicles will have value to other Americans. There are better ways for Congress to ensure continued fuel efficiency and lower vehicle emissions.

- MEMA would encourage the Committee to consider ways to ensure greater safety of all vehicles on the road. In 2019, unperformed and under-performed maintenance totaled \$41 billion. MEMA has long been a strong advocate of vehicle safety inspections. Yet only fifteen states have a periodic (annual or biennial) safety inspection program, while Maryland requires a safety inspection and Alabama requires a VIN inspection on sale or transfer of vehicles which were previously registered in another state. We urge Congress to set aside funding in an infrastructure package to assist states in the creation or maintenance of state safety inspections, including the reduction of fees for some citizens.

Finally, MEMA's automotive aftermarket division, AASA, has separately addressed the important issue of data access for the purpose of maintenance and repair. The significance of maintaining consumer choice, transparency, and affordability in auto repair cannot be downplayed. Consumers deserve to decide how and with whom they share their vehicle data. MEMA is committed to working with all parties, automakers, dealers, and consumers, to assure the continued ability of American to repair and maintain their vehicles in the manner and place of their choice.

### **Workforce**

Workforce development is one of the most significant challenges facing the industry. The skilled worker shortage continues to grow. Suppliers support programs throughout the United States that focus on all levels of the workforce and potential workers—middle and high school students, high school graduates, two and four-year college graduates, continuing education, and non-traditional students. Yet, these programs are not sufficient to meet the evolving needs of the industry or the American public.

MEMA supports—

- Establishment of a broad National Institute of Manufacturing (NIM) to encourage Federal coordination of policy and streamlining of manufacturing programs;
- An assessment of current Federal workforce programs;
- Incentives for workers to enter and re-enter manufacturing;
- Adoption of policies that enhance the educated and mobile workforce in the quickly changing automated manufacturing world;
- Federal partnerships with state and local governments and private industry to provide training and support for technical colleges and apprenticeship programs;
- Restoration of open immigration and H1B and L-visa policies to assist in workforce development and ensuring skilled workforce needs are met; and,
- Preservation of market-oriented labor policies.

MEMA urges Congress to consider the evolving workforce needs of suppliers to ensure that today's workers, as well as tomorrow's, are equipped with the skills necessary to manufacture these advanced technologies here in the U.S.

### **Conclusion**

This industry is in a transformative moment that can provide greater mobility, safety, and environmental protection for our citizens. MEMA is committed to being a part of the ongoing discussions on all aspects of the legislation facing Congress.

As these discussions continue, MEMA urges Congress to consider the five fundamental needs outlined above to support the supplier industry and our workforce. Our nation requires these tools for the complex vehicle supplier industry in this country to remain competitive.

For any additional information or questions, please contact Senior Vice President of Government Affairs Ann Wilson ([awilson@mema.org](mailto:awilson@mema.org)) or Vice President of Legislative Affairs Catherine Boland ([cboland@mema.org](mailto:cboland@mema.org)).

Senator PETERS. Thank you, Ms. Wilson, for your testimony.

Our final witness is Mr. Reuben Sarkar, who serves as President and CEO of the American Center for Mobility in Ypsilanti, Michigan.

Mr. Sarkar also has a wealth of industry experience as well as public service experience. This includes Mr. Sarkar serving as Dep-



uty Assistant Secretary for Transportation at the U.S. Department of Energy where he handled issues relating to energy and the transportation sector.

Mr. Sarkar is also a proud University of Michigan alum where he earned both his Bachelor's and his Master's degree.

Mr. Sarkar, welcome to the Committee. You may proceed with your 5 minute opening remarks.

**STATEMENT OF REUBEN SARKAR, PRESIDENT AND CEO,  
AMERICAN CENTER FOR MOBILITY**

Mr. SARKAR. Thank you. Subcommittee Chair, Senator Peters, Ranking Member, Senator Fischer, and other Members of the Subcommittee, thank you for the invitation to speak regarding the Future of Vehicle Safety, Mobility, and Technology, and the ways in which Congress can help the U.S. mobility industry position ourselves at the global forefront of innovation.

The American Center for Mobility or ACM is a nonprofit smart mobility test center that is serving to accelerate the mobility industry through testing, standards development, and educational workforce programming.

Located in Southeast Michigan on over 500 acres at the historic Willow Run site, ACM has over 200 million invested into infrastructure, facilities, and technologies that make up ACM's shared use of Smart Mobility Test Center. This test center provides a safe platform for the testing and validation of mobility technologies.

Advances in mobility technologies, such as automation, have the U.S. at the transformative edge of the way that people and goods will be moved through an emerging mobility ecosystem.

The state of readiness for mobility innovation is dependent on the validation of these technologies to perform as intended in the real world based on measurable standards and regulations and supported by a properly trained workforce.

Automated vehicles or self-driving cars have demonstrated millions of miles of operation on public roads and substantial improvements in the number of self-driven miles achieved without human intervention.

While driving on public roadways provides the most realistic driving data, it can be prohibitive from a cost and development cycle perspective. Test AVs for deployment solely using public roads.

Studies indicate that it could take hundreds of millions, if not billions, of miles of public road driving to validate these technologies without the use of more advanced validation tools and resources.

Smart mobility test centers, such as ACM, have been established on the principle of leveraging a three-tiered approach to validation of new mobility technologies, which are based on virtual simulation, followed by testing in a controlled track environment, and a carefully managed public on-road testing as part of a comprehensive and iterative approach to validation.

Simulation allows for millions of miles to be driven virtually to identify the limits of operation of systems before conducting vehicle testing, though track testing that is informed by simulation allows for targeted, controlled, repeatable, and safe vehicle testing. Public

road testing, in turn, provides real-world data which can be used to better understand the edge cases around which self-driving cars must be trained and tested.

This self-reinforcing process of validation can substantially reduce the cost and the development cycle for validating AVs. Many advanced validation capabilities have been a direct result of Federal investment.

We recommend that Congress continue to invest in the development of capabilities that lower the cost in the development cycle to validate AVs through Federal research grants and government contracts, such as NHTSA's IDIQ Programs, and to encourage the use of smart mobility test centers for validation of new technologies.

Standards and regulations serve as the measuring stick for determining the readiness of vehicle technologies for safe deployment.

Industry standards are used as input into Federal standards. However, they are often developed concurrently with Federal standards.

Furthermore, Federal test procedures are often not tested by industry before they get written into Federal standards. The ability for industry to test prospective Federal standards before they are written into law will help ensure the laws are informed and feasible with less rework.

We recommend Congress to provide funding to accelerate the development of industry standards so that they can be appropriately referenced in Federal standards and to evaluate Federal test procedures used in standards before they get written into Federal law.

With regards to workforce, long-term global competitiveness of the U.S. mobility sector is tied directly to the talent pipeline that feeds the American workforce.

As with any new wave of innovation, there's a spike in demand for the most highly qualified people followed by a gap in supply. In many cases with the right training, middle skills jobs can fulfill critical in-demand positions in the automotive sector while helping create good paying high quality jobs.

There's a projected increase in enhanced skills in software, data-related systems, and cyber-related work necessitating the need for up-skilling of the mobility workforce.

We recommend Congress to make education and workforce development a key priority spanning the full talent development pipeline, starting with K-12 through professional development.

The safe, timely, and successful deployment of new mobility solutions requires purposeful focus and investment by Congress and Federal agencies to develop capabilities for validation of technologies, industry standards to support Federal regulations, and a globally competitive workforce.

The American Center for Mobility would like to thank Congress for allowing us the opportunity to share our insights with you today. Thank you.

[The prepared statement of Mr. Sarkar follows:]

PREPARED STATEMENT OF REUBEN SARKAR, PRESIDENT AND CEO,  
AMERICAN CENTER FOR MOBILITY

### Introduction

Subcommittee Chair Senator Peters and Ranking Member Senator Fischer, Full Committee Chair Senator Cantwell and Ranking Member Senator Wicker, and other members of the Commerce Committee, I thank you for the invitation to speak regarding the future of vehicle safety, mobility, and technology and the ways in which Congress and stakeholders can help the automotive industry, which merges now with the mobility industry, to provide equitable access, create job growth, and position America at the forefront of global innovation.

My name is Reuben Sarkar, and I am the President & CEO of the American Center for Mobility (ACM), a non-profit, public private partnership comprised of government, industry, and academic organizations. ACM is uniquely positioned for accelerating the mobility industry through research, testing, standards development, and educational workforce programming. Located in Southeast Michigan on over 500-acres at the historic Willow Run site, where 80 years ago Henry Ford led America in the Arsenal of Democracy by creating a new workforce and using innovative technologies to build one bomber an hour, an effort that helped win WWII. Today, the Willow Run site has over \$200M invested into new mobility innovations including infrastructure, facilities, technologies, and equipment that make up the ACM's premiere global smart mobility test center. This test center provides a safe platform for the research, testing and validation of emerging vehicle and mobility technologies, environments for showcasing vehicle technologies and convening industry, government, and academic activities, and an innovation technology campus for the co-location of mobility companies. ACM is a neutral convener of mobility topics, led by an Industry Advisory Board comprised of automotive, communications, and technology companies that inform ACM on facility development, and form dedicated committees that focus and inform on a variety of mobility topics.

My remarks today will focus primarily on ACM's core competencies in research, testing, standards development, and educational workforce development. Further, I will comment on the importance of the differentiation between closed track and open road testing, and the continued need for smart mobility test centers as leading-edge, controlled, and safe places to research, test and validate new mobility technologies.

### Relevant Statistics

According to NHTSA, there were 36,096 fatalities in motor vehicle traffic crashes in 2019, a slight decrease over 2018, the vast majority resulting from human error.<sup>1</sup> Based on preliminary projections, GHSA estimates that the nationwide number of pedestrians killed in motor vehicle crashes in 2019 was 6,590, an increase of 5 percent from 2018, which in turn was up 3.4 percent from 2017.<sup>2</sup> The average U.S. household spends over 15 percent of its total family expenditures on transportation, making it the most expensive spending category after housing.<sup>3</sup> This can be up to 30 percent for lower income households. From an energy and environment perspective, the transportation sector accounts for approximately 30 percent of total U.S. energy needs and is the largest source of greenhouse gas (GHG) emissions in the energy sector.<sup>4</sup> However, advances in mobility technologies ranging from automation, telecommunications, data and compute have the U.S. at the beginning of a transformation of the way that people and goods are moved through an emerging mobility ecosystem—one that offers the promise to make transportation safer, more affordable, accessible, and cleaner. Transportation is also critical to the overall economy, from the movement of goods and people, to accessing food, jobs, education, and healthcare.

### State of Mobility Innovation

The state of mobility innovation, as it pertains to ACM's areas of expertise, is dependent on the validation and readiness of vehicle technologies (*e.g.*, automation), communications (*e.g.*, cellular C-V2X, 5G), data & computational infrastructure, cybersecurity, standards and regulations, and educational workforce development.

### Smart Mobility Test Centers

Smart Mobility Test Centers, such as ACM's, have been established on the principle of leveraging a three-tiered approach to AV technology development and vali-

<sup>1</sup> <https://www.nhtsa.gov/press-releases/roadway-fatalities-2019-fars>

<sup>2</sup> *Pedestrian Traffic Fatalities by State: 2019 Preliminary Data* / GHSA

<sup>3</sup> *Transportation Energy Data Book Edition 37*, ORNL, Table 10.1.

<sup>4</sup> *Transportation Energy Data Book Edition 37*, ORNL, Table 2.1 U.S. Consumption of Total Energy by End-Use Sector.

dition. The use of virtual simulation followed by testing in a controlled environment and then carefully managed on-road testing is proven to be an effective comprehensive testing and development approach. It is acknowledged that autonomous vehicle (AV) technology companies cannot move directly to wide-scale on-road deployments by testing solely on public roads without incurring some level of risk and incurring prohibitive development costs and timelines. Also acknowledged is that it could take hundreds of millions, if not billions, of public road miles to encounter adequate scenarios and edge cases necessary to validate these advanced technologies. The ability to efficiently utilize the three-tiered methodology for testing has proven to be a more effective approach to advancing the technology and progress toward validation.

It is a common theme in the AV industry that more advanced tools for modeling and simulation, coupled with better access to data management and analytics is needed to effectively support virtual testing activities. Leveraging virtual testing as a key component within the development cycle is one way to compress the overall development cycle. The ability to run millions of miles *virtually* in simulation to identify the limits of operating systems can save months or even years of development and data gathering time within the validation cycle. Modeling and simulation also allow for the integration of advanced features such as Augmented Reality and Machine Learning into the process, adding to the acceleration and rigor of the overall development cycle timeline. The more advanced the tools are, the more effective the virtual simulation is, resulting in less overall development cycle time and cost efficiencies. In many cases these advanced modeling and simulation tools are developed and enhanced through targeted research including federally funded research in partnership with U.S. National Laboratories and AV test beds that is leading to development of more of these advanced tools.

Analysis of large public driving data sets is a necessary approach to identifying a more expansive library of edge cases that need to be run in simulation and validated in a closed track environment, prior to considering public road deployment. This supports the continued need for the availability of smart mobility test centers as leading-edge, controlled, and safe places to research, test and validate new mobility technologies. These controlled test beds require continued investment to provide state of the art capabilities and upgrades with evolving technologies necessary to enable the industry in the acceleration of advanced mobility solutions. Test activities and system validation accomplished in these controlled test beds are a necessary precursor to eventual testing and validation on public roads and to maintaining global leadership in new deployments.

Controlled track testing is essential to the development and validation cycle as it allows for critical activities that are difficult to accomplish in a public road environment such as the following:

- Testing against true edge case with unsafe maneuvers, erratic movements, incorporating multiple controlled vehicles.
- Validating interoperability between two or more manufacturers, which would be time consuming and difficult on public roads.
- Achieving reliability & repeatability for testing, necessary to achieve validation.
- Accelerating the development cycle. By managing scenarios and experiences in a controlled environment and leveraging advanced tools it is possible to achieve an equivalent of track-to-road mileage as high as 1-to-5000 miles. Public road driving does not expose vehicles to challenging circumstances often enough through normal driving.
- Scheduling controlled weather testing. Public road testing would require you to wait for specific weather situations that may need to be tested against. Certain weather conditions can be created in controlled environment test beds.
- Offering unlimited configurations and technology integrations. Testing new and variable infrastructure technologies with vehicle technologies could be costly in a public road environment due to bureaucracy and timing to install and switch them in and out.
- Testing against variable communications and connectivity levels. Controlled environments allow for the ability to establish variability in connectivity and latency.
- Testing at night that is necessary to validate sensor detection and classification.
- Engaging vulnerable road users, such as pedestrians, bicyclists, motorcyclists, and scooters into real world edge case testing which is not advisable or in many cases allowed in public road environments.

Having national recognition and a level of Federal support for these AV test beds has taken a step back. In January 2017, the USDOT designated several facilities

as national AV Proving Grounds (AVPG). This designation allowed for the facilities to coordinate, share best practices, and support the collective enhancement of these necessary resources. Following the designation of the AVPGs, Congress approved funding for which AVPG's could be eligible. The designations were rescinded in the fall of 2018 and the coordination and collaboration of these facilities has reduced significantly. There would be relevant value and national benefit for reestablishing those designations and establishing programs that support their growth and function.

#### *Automated Vehicles*

Automated vehicles (AV's) or self-driving cars have demonstrated millions of miles of operation on public roads. In 2020, California Department of Motor Vehicles reported 1,955,201 of self-driving miles recorded in the state, down from 2,855,739 miles driven in 2019 due in part to COVID. Since 2017, California has demonstrated a 4–8-fold increase in the number of self-driven miles achieved without human intervention ranging between ~28,000–30,000 miles driven between AV disengagements. This represents substantial improvements in self-driving without human intervention from just a few years earlier.<sup>5</sup> Industry leaders have demonstrated more than 20,000,000 AV miles including 74,000 miles without any safety-drivers.<sup>6</sup>

However, according to NHTSA in 2019 on average there were 1.1 traffic fatalities per 100 million vehicle miles traveled,<sup>7</sup> meaning that the market leaders have only driven roughly 20 percent of the of the miles typically associated with a single traffic fatality. Studies have shown that to prove that an AV is 20 percent better than a human driver with respect to fatalities you would have to drive 5 billion miles. To demonstrate the same 20 percent improvement with regards to avoiding crashes or avoiding injuries it would take 28 million and 170 million miles, respectively, which can take decades or more to accumulate through driving on public roads.<sup>8</sup> While driving on public roadways demonstrates the real-world potential of these technologies and provides the most naturalistic driving data, it is prohibitive from a time, cost, and risk perspective to test AV's for commercial deployment solely on public roads.

#### *Advanced Driver Assistance Systems (ADAS)*

Advanced Driver Assistance Systems (ADAS) with lower levels of automation have been demonstrated to prevent or lessen the severity of crashes and are being commercially deployed with continued product development to enhance Level 2 automated performance. In 2019, research performed by the Insurance Institute for Highway Safety (IIHS) found that these systems can help to prevent and lessen the severity of crashes, with autobraking reducing front-to-rear crashes with injuries by 56 percent, forward collision warning systems reducing front-to-rear crashes with injuries by 20 percent, and blind spot detection reduced lane-change crashes with injuries by 23 percent.<sup>9</sup>

#### *Communications and Connectivity*

Communications technologies that enable vehicle to everything connectivity (V2X) are still at the nascent phase of deployment. Recent FCC rulemakings on the 5.9 GHz spectrum have made dedicated short-range communications (DSRC) obsolete and require new upgrades to cellular CV2X technologies that are only now starting to be deployed for purposes of testing. 5G (or the fifth-generation technology standard of broadband cellular networks) has the potential to bring order of magnitude faster speeds (>10X), lower latencies and the bandwidth needed to connect many more devices than today's 4G technologies. We are seeing the roll out of 5G for personal devices such as cell phones today, but the full capabilities and infrastructure required to enhance vehicle control and operation through 5G connectivity are still years away.

Connected vehicles and automated vehicles can be considered mutually exclusive technologies. AV's can be self-driven without being connected, reacting to what they can sense. However, to get the full benefits from cooperative driving, connected *and*

<sup>5</sup> <https://www.dmv.ca.gov/portal/vehicle-industry-services/autonomous-vehicles/disengagement-reports/>

<sup>6</sup> <https://storage.googleapis.com/sdc-prod/v1/safety-report/2020-09-waymo-safety-report.pdf>

<sup>7</sup> <https://www.nhtsa.gov/press-releases/roadway-fatalities-2019-fars>

<sup>8</sup> Kalra, Nidhi and Susan M. Paddock, Next Stop, Neptune? Why We Can't Rely on Test-Driving Alone to Assess the Safety of Autonomous Vehicles, Santa Monica, Calif: RAND Corporation, IG-128, 2017. As of April 08, 2021: <https://www.rand.org/pubs/infographics/IG128.html>

<sup>9</sup> <https://www.iihs.org/media/259e5bbd-f859-42a7-bd54-3888f7a2d3ef/e9boUQ/Topics/ADVA%20NCD%20DRIVER%20ASSISTANCE/IIHS-real-world-CA-benefits.pdf>

automated vehicles (CAVs) require vehicle to vehicle and infrastructure (V2V and V2I) communication. There is still an open debate as to the degree to which connectivity is required for wide-scale deployment of level 4–5 AVs beyond specific operating design domains (ODDs) such as geofenced or low speed vehicle applications. If deployed properly, CAVs can greatly improve the safety, congestion, operational efficiency, and throughput of our transportation system, and further new streams of commerce and consumer experiences. CAV technologies require widespread, reliable, interoperable infrastructure networks, the timeline for deployment of which is still unknown. As such, AV developers are pursuing to deploy AVs in parallel with connectivity that will evolve over time.

#### *Data Management and Analytics*

CAV technologies can generate terabytes of data per day per vehicle and petabytes even with very small fleets. The challenges to transfer, ingest, store, analyze, manage, and compute with such high volumes of data is one of the largest challenges related to AVs and CAVs, namely what to do with all of this data and how to pay for it. The data however, particularly from driving on public roads is extraordinarily valuable in its use for training artificial intelligence in self-driving vehicles. Those who have access to “naturalistic data” from public self-driving are highly protective of the data as a major competitive advantage. It is very costly to develop and manage public road driving data that provides access to edge case scenarios that are currently not widely available. The infrastructure required to manage and to use this data both from AV development purposes and for AV operational purposes requires substantial investment. Optimizing data along with onboard, edge, and cloud compute is an open area for research and development.

#### *Industry Standards*

Standards and Regulations serve as the measuring stick for determining the readiness of vehicle technologies for safe deployment. Industry standards are often used as inputs or referenced in Federal Standards and are actively being developed. However, in the case of the rapidly evolving mobility space they are being developed concurrently with Federal Standards and in some cases may be reactive to Federal Standards once they are released. Federal Test Procedures used in standards are often not tested by industry before they get written into Federal law or standards for U.S. DOT. The ability for industry to test to prospective Federal Standards and to provide objective input before they are written into law would help to ensure the laws are informed, feasible and further streamline both the process of enacting new regulations and the ability to test, validate and deploy new technologies, avoiding a lengthier and more reactive process.

Providing equitable access to world class safety and mobility solutions will likely require creative fleet-operated/managed SAE Level 4 and 5 ADS-dedicated vehicles (ride-hailing or product delivery). This is due to the high cost of these advanced systems, which make it unrealistic for them to be offered on entry level vehicle models and not able to offer equal access. The Industry is recognizing this challenge and has started defining best practices through organizations like the AVSC (Automated Vehicle Safety Consortium). AVSC issued a best practice on passenger-initiated trip interrupt systems, and most recently on safety metrics for fleet operated/managed vehicles. These types of best practice efforts regarding new mobility technologies will help provide a neutral platform to share information, lower costs of technologies and ultimately benefit consumers more equitably. Evolving the best practice guidance into testable standard requirements through work at sites like ACM will ensure adequate standardization of technologies and infrastructure.

Standardization helps to ensure consistent design features for vehicles and infrastructure. This can streamline the testing process by limiting variability and improving interoperability. Testing currently being performed at AV test beds such as ACM require modifications to infrastructure at the test site to account for infrastructure variability. Currently, vehicles must be driven through multiple states to seek out unique infrastructure characteristics to ensure the vehicle is equipped to perform as intended. There is an opportunity to reduce this variability going forward through consistent industry standards and test requirements for new mobility technologies both within the infrastructure and vehicles.

#### *Education and Workforce Development*

When the Willow Run WWII bomber factory was built in 1941, it included a workforce training and education center, because Henry Ford knew that an educated workforce is the only real differentiator. Just as it was then, a new era of automotive and mobility technologies brings to the surface the importance of building an inclusive and adaptive educational system, provides equity and opportunity. Long term global competitiveness of the U.S. automotive and mobility sectors is tied

directly to the talent pipeline that feeds the American workforce. With any new wave of innovation, there is a spike in demand for the most highly qualified people followed by a gap in supply. On a global scale the ongoing growth in the technology industry has created a critical shortage of talent throughout all major business sectors. This coupled with the recent COVID crisis has intensified the already stressed talent and skills pipeline the automotive and mobility industries have.

In 2019, ACM commissioned the University of Michigan Economic Growth Institute (UofM EGI) to research the skills demands related to the CAV middle skills sector.<sup>10</sup> In many cases with the right training these middle skills jobs could fulfill several current in-demand positions in the automotive sector, while helping create good paying, high quality jobs that keep a large part of our workforce relevant in highly dynamic industries. As more CAV-related products move from the R&D space into production, the demand for middle-skills jobs in the CAV sector have correspondingly grown.

The Middle Skills report highlighted the forecasted needs for specific jobs, including CAV technicians, safety drivers, CAV maintenance technicians, and cybersecurity technicians through 2022. In addition to the base mechanical, electrical and electronic foundational skills required for these jobs, there is a projected increase after 2022 for enhanced skills in software, data-related systems, systems thinking, and cyber-related work. Because this is a complex set of skills to obtain in a 2-year timeline, the report recommends that through strategic partnerships with OEMs and key industry organizations the “development of experiential education programming could best supplement the institutional programming already developed.” Course offerings that upskill and/or re-skill with hands-on, real-world experiences will play a critical role the success of the mobility workforce.

The implications from this middle skills report require immediate and actionable attention towards curriculum development and technology integrations starting with K12 preparation, feasible high school certifications, hands-on high-tech universities, and lifelong professional development. The digital skills needed for the technology era are not just applicable to automotive and mobility-related jobs, but they mirror the overall growing skills needs in manufacturing, smart cities, smart technologies, electrification, infrastructure, healthcare, and general jobs of the future. The investments into curriculum to develop technology related skill sets will strengthen the American workforce and keep the Nation competitive globally.

### **Ensuring America Leads the Global Automotive & Mobility Industry**

The safe, timely, and successful deployment of will new mobility solutions such as connected and autonomous vehicles face ongoing challenges in the areas of research to develop new tools, testing to validate technologies, industry standards to support regulations, and education & workforce development to maintain a rigorous and globally competitive workforce. To move the current state of innovation forward, ACM recommends Federal policymakers to take action to address the following challenges:

#### *Research & Testing*

Develop capability that lower the cost and lead time to validate AV's and CAV's.

- Invest through directed Federal Research and grants into advanced methods and tools to help lower the mileage and cost hurdle for validation AV technologies. This includes development of more capable AV tool chains including modeling and simulation tools that are validated against real-world conditions, data management and analytic (DMAP) platforms, edge case scenarios based on naturalistic data, and augmented reality simulation tools which can compress lead-time, cost, and lessen risk for public road validation.
- Invest into shared use smart mobility test centers and closed tracks as test beds for safe, controlled, repeatable testing and validation and interoperability testing of connected and automated vehicle technologies.
- Provide more funding opportunities for directed Federal Research through NHTSA Indefinite Duration Indefinite Quantity (IDIQ) programs that leverage the capabilities of existing test beds.
- Invest in R&D and demonstration for optimization of communication and on-board vehicle, edge, and cloud compute.
- Establish a National Pilot Program through DOT for AV testing and deployment that incorporates use of AV tool chain and closed track testing ahead of

<sup>10</sup> <https://www.govrel.umich.edu/index.php/understanding-the-middle-skill-workforce-in-the-connected-automated-vehiclesector/>

public road demonstrations as part of a simulation to track to road approach to ensure safe deployment of AV pilots.

#### *Industry Standards*

Accelerate the development of industry standards as inputs into Federal Standards.

- Provide funding to accelerate the evolution of best practices and guidance documents into consistent repeatable standards and test requirements will provide valuable information that can be referenced by NHTSA in FMVSS rules. Federal Rules that are based on standards help to ensure harmonized system performance from the beginning, and limit costly re-work or re-design. By accelerating and referencing industry developed standards, alignment with industry can be assured.
- Provide funding for testing to evaluate Federal Test Procedures used in standards *before* they get written into Federal law and standards for U.S. DOT. Industry to lead with public standards available through standards (SAE Jdocs, UL, AVSC) for Federal government to reference.
- Establish funding at the Federal level for efforts to evolve the best practices being published by industry into standards and test methods to ensure consistent, reliable, fleet managed systems across state lines. This would ensure that OEMs and Fleet Service Providers develop systems that are similar, limiting confusion for the public users.

#### **Education and Workforce Development**

The American education system needs to offer skills development for the fourth industrial revolution from a young age, provide new opportunities, and encourage lifelong learning to help American workers thrive for the next hundred years. From a Federal perspective the challenge of empowering the educational system and bringing new opportunities to the automotive and mobility workforce is complex, and the focus of the administration seems rightly aligned. ACM recommends the following areas of focus:

- Implementation of a National Automotive & Mobility Career Awareness and Recruitment Campaign. Industry organizations focused on talent perception and attraction continue to identify the critical need for a larger talent pipeline. Regional surveys show that students are not aware of new opportunities in the emerging automobility workforce and/or they are not encouraged by peers to seek careers in this sector due to historic market volatility. There is a great opportunity to generate interest for a new American workforce through a coordinated national effort that showcases the diversity of innovative, meaningful, and good paying jobs available today in the automotive and mobility industry.
- K12 Foundations: The skills required for middle skills jobs are complex and technical, education must start earlier with focus on skills development for a technology focused world. Acknowledge the critical need for and support K12 in providing technology-focused, project-based curriculum for teachers and students.
  - Develop K through 12 curricula focused on evolving key skills areas including mechanical, electrical, electronic, software, data-related systems, systems thinking, design thinking and cyber-related work, in addition to development of critical soft-skills communication, task management, collaboration, problem solving, ethics, and logic.
  - Provide teachers with access to focused curriculum using an agile approach that can evolve with the fast pace of technology and industry needs.
  - High School Certifications in high-demand middle skills jobs such as: CAV technicians, safety drivers, CAV maintenance technicians, software developers, and cybersecurity technicians.
- Middle Skills Jobs: The automotive industry has a high demand for middle-skills jobs including CAV technicians, safety drivers, CAV maintenance technicians, and cybersecurity technicians. The skills required for these jobs are highly transferrable throughout the automotive lifecycle from research, design, development, test, validation and through to manufacturing, infrastructure, and service. With these skills workers will have a foundation to build on, coupled with ongoing training for lifelong employability. The gap will not be filled quickly, easily or in a silo by one organization or one state, but through a large-scale nationally coordinated effort that acknowledges the shift in skills needs throughout the automotive and mobility sectors. Success will be in the long-



term commitment from industry organizations to provide internships, apprenticeships, and employment, and from government for both academic and learning organizations, and for the students who need time to build this complex set of skills.

- **High-Tech Talent:** There is a need for high-tech talent, including a variety of engineers including in software, autonomous vehicles, and data science. Addressing outreach, K12 and Middle Skills topics will take time, but will set a base for long-term growth of a high-tech talent pipeline and ultimately, higher skilled and higher paying jobs. In the current workforce there remains an immediate gap in high-tech talent, where the lack of staff translates into slowed technology development timelines. Continued efforts to facilitate foreign support to fill talent gaps, will help companies remain rooted to their American footprint and keep work packages in an accelerated mode.
- **Professional Development & Upskilling:** With the fast pace of evolving technologies, skills needed in the automotive and mobility industries are quickly changing, too. To remain employable, workers at all levels must adapt to a new learning paradigm in which ongoing skills development is required to stay relevant and in-demand. It is imperative that people have the means and access to develop new skills as fast and as much as they can. Providing incentives for targeted programs that align with industry needs is a viable way to keep the talent pipeline robust on a long-term basis, and American workers best-in-class.

### **Conclusion**

The American Center for Mobility would like to thank Congress for its focus on and attention to the needs of the automotive industry. The ability to keep pace with technology innovations, facilitate their safe implementation into our society, and build a rigorous talent pipeline and a thriving workforce will succeed as much as they are enabled by a comprehensive and ongoing effort between all levels of government, industry, and academia. The ACM encourages purposeful Congressional and Federal engagement and investment into research, testing, standards, and education and workforce development to safely accelerate these enabling mobility solutions to market.

This concludes the American Center for Mobility's statement. Thank you for the opportunity to share insights from the automotive and mobility industry. ACM looks forward to working with Congress in an ongoing effort to address critical issues that influence the ability to accelerate automotive and mobility technology innovations and implementations, and keep America globally competitive.

Senator PETERS. Well, thank you, Mr. Sarkar, for your testimony.

I want to start this hearing with the questions by talking to you about your incredibly powerful testimony that you gave to open up this hearing. It was certainly very fitting to open it up with your personal experience.

I'll just have to say that your advocacy, your relentless pursuit of a safer future, despite the very painful memories, is certainly getting Congress to focus on legislation that's going to help stop these drunk driving tragedies from occurring, and please know that I'm proud to co-sponsor the RIDE Act and I'll be with you every step of the way to get this done.

I'd just like you to take a moment to tell this committee just why it is so important that the RIDE Act be taken up, what it means for your family, what it means for families all across America, and why we need to move this legislation forward.

Ms. TAYLOR. Thank you, Chair Peters, and thank you again for your support and co-sponsorship of the RIDE Act. I cannot tell you how incredibly grateful we are for that support.

You know, for those who know me and, Chair Peters, I know we've known each other for some years, political advocacy has always been something that has ran through my blood, but it is different when an issue comes knocking on your front door.

The loss of my family upended my world and there are still very few words that I can find that allow me to articulate adequately the magnitude of this loss for me. It was just devastating for our family.

As far as being involved, there's one thing that for me changed the game and that is when we attended the initial introduction of the RIDE Act in October 2019. There was a press conference held here in D.C. and during that event, MADD's Chief of Government Affairs shared with me how our family's loss changed everything and how we were familiar. We knew for a fact through a contact that we have who's been indispensable to us, Ken Snyder, who is the Head of the Shingo Institute at Utah State, that technology was and is available that could have saved my family.

That was for me an awakening and I could not walk away knowing that my family's loss could have been prevented and it wasn't and I certainly cannot walk away today knowing that we can save 10,000 lives a year by putting this technology that's already available into vehicles.

Senator PETERS. Well, thank you.

Mr. Bozzella, as Rana mentioned, every day we have deaths on our highways. In fact, around a hundred people lose their lives on American roads each and every day. It's a horrific number and it represents one of our country's greatest policy failures in my mind, and when we talk about the hundred lives lost every day, there are hundreds of thousands of injuries, some of them debilitating, that occur on a regular basis, as well.

We don't have to accept that status quo and certainly Rana Abbas Taylor articulated that very powerfully, that we need to take action, and we know a significant number of these deaths are not just drunk driving but it's also just simply human error, and we know that autonomous vehicles can eliminate that error significantly and literally save lives.

You know, when we think of other technologies that have come along from air bags to seatbelts, they all had some challenges initially starting out, but we know the impact has been dramatic, and we know that this technology of autonomous technology has this power to save lives and every day that we delay implementing this technology and advancing the research and developing the technology further means more people will be dying on our highways. It's fairly clear.

So my question to you, sir, is considering that this technology is the future of the industry, what do we need to ensure that they're built here in the United States, that the U.S. is the leader in this technology, and what are the consequences if we don't get it right?

Mr. BOZZELLA. Yes, Senator, thank you for the question, and you are exactly right.

We have to do better. We have to work with the sense of urgency to reduce highway fatalities and injuries on America's roadways.

Automated vehicles hold tremendous promise. There is great opportunity here. We do need a national strategy. We do need a framework that gets us to a new type of regulation, regulation that recognizes the promise of highly automated vehicles that allows us to create an interim process right now to test and deploy AVs on public roads safely and to get the data necessary for the agency to

rewrite the rules and to re-imagine Federal motor vehicle safety standards. That is absolutely critical.

Here's what's at stake. Our competitiveness is at stake. Other nations that have automotive sectors aren't standing idly by. They are working every day to seize supply chains, to develop technology, and to write the rules of the road.

We need to be in that game. We enjoy a leadership position now and we risk losing it if we don't create this national framework to deploy and test highly automated vehicles at scale safely and effectively.

Senator PETERS. Well, thank you for that. A vote has been called and so I will recognize Ranking Member Fischer for her comments. I will also pass the gavel to her as I run to the Floor and, Senator Fischer, I will run back and be back in time for you to make sure that you can cast your vote, as well.

Thank you.

Senator FISCHER. Thank you, Mr. Chairman.

Ms. Taylor, I want to again thank you for being here today to tell your story, and I appreciate hearing your testimony.

You mentioned that technology exists to identify driver impairment and stop a vehicle. Could you elaborate a little on that technology for us?

Ms. TAYLOR. Yes, there are numerous technologies that are available and what we have come across, which is submitted in the RFI for record, are 241 available ones.

Much of this technology is passive technology, driver monitoring, driving monitoring, and as simple—as I am not a tech expert and please know that I am here specifically on behalf of my family and the families of those MADD victims that have been working on this, but what I do know is the technology is available. It is passive. It is as simple as even a code switch to get it into vehicles, yet we are still holding on.

I hope that from my perspective the Committee members can understand what I hear when I hear that either it's not time yet or I hear that more research needs to be done, I just hear that more lives need to be lost before we can do this and that's not OK and it's not enough for me and I know it's not enough for the many victims that have been advocating tirelessly to make sure no families go through what we have.

Thank you.

Senator FISCHER. Thank you very much for your powerful and impactful testimony.

Mr. Bozzella and Ms. Wilson, in January NHTSA announced a final rule to update certain definitions in vehicle crashworthiness standards to account for automated and passengerless vehicles. However, NHTSA has not officially published that final rule, meaning the rule has not gone into effect.

Do you believe NHTSA should publish that final rule and, if so, why? Start with Ms. Wilson.

Ms. WILSON. We submitted comments to those rules. Crashworthiness is something we work on very closely with our customers obviously. We think there's a lot of data there. As Ms. Taylor recognized, there's a lot of data out there on passive technology.

I would have to get back to you about whether we think it's time to publish that specific rule.

But I would like to go back to a theme that Ms. Taylor talked about in her original testimony. It is not okay where we are. In our witness statement, we have said that NHTSA has lost a lot of its momentum and I want to be really clear about where the supplier industry is on the NCAP Program.

The NCAP Program has sufficient data to move forward, to really talk to consumers about these passive technologies that she mentioned, like AEB, lanekeeping, blind spot detection, to give that information, and they can do this very quickly.

At the same time, we can talk about these roadmaps or other things that can be done because, as we know, and you've sort of mentioned that in your question, these rulemakings take a substantial amount of time and we don't quite understand why we should hold still for that time for rulemaking when we can start to provide some consumers with at least the tools to move forward.

It's not OK where we are. We're losing ground competitively, but we are also losing lives every day.

Senator FISCHER. Thank you.

Mr. Bozzella, please.

Mr. BOZZELLA. Yes, Senator Fischer. I agree with Ann. I think there's an opportunity here to take a more strategic and more robust approach to this through NCAP. We haven't looked at NCAP and really addressed NCAP since 2011.

We have an opportunity to use that really important tool to add crash avoidance technologies right now to kind of kick start the program as well as to lay out a roadmap to make sure that we're focused on the right technologies that stakeholders are contributing and that we identify the regulations of the future that are necessary to continue to improve safety.

Senator FISCHER. Thank you.

I know both of your organizations have called for updating NHTSA's New Car Assessment Program, which provides vehicle safety ratings for public information.

Why is updating NCAP important to your members, and can you briefly describe your recommendations?

Mr. BOZZELLA. Yes, Senator. First, the first recommendation is to establish long-term and mid-term roadmaps, technology roadmaps, opportunities for regulators and technology innovators as well as other stakeholders to come together and lay out a long-term game plan. What that does is it creates a win-win-win.

Manufacturers understand how the regulators are looking at these technologies and we can bring them into the fleet and use the New Car Assessment Program to create ratings. This produces consumer confidence.

We think another important recommendation is to bring all of the stakeholders together, other researchers, other safety advocates and others who have opinions about the importance of safety ratings.

And then, finally, we would suggest adding crash avoidance technologies to NCAP right now, things like automatic emergency braking and forward collision warning systems, lane-keep assist and the like, because we should be rating those technologies, as well.

Senator FISCHER. Ms. Wilson?

Ms. WILSON. And I think one thing to reiterate here is that—well, first of all, our NCAP Program is rated one of the worst, least effective NCAP Programs in the world.

I'll get you for the record the list of technologies, but it is sad. You talk about a competitive disadvantage, it's right there in how they rate NCAP Programs. So, first of all, that's one piece of this.

A lot of these technologies are already available on vehicles. Many times when you go buy a vehicle right now, you'll have AEB and other things. We need to get this information out there, and I think one of the refrains that we keep hearing is a lot of this information is already available to the Department of Transportation and to NHTSA. There is a full docket on NCAP.

I think where we may disagree a little bit with our customers is I think we're willing to be a little bit more forward leaning and take a look and say to NCAP, look, can't you provide a forward-looking roadmap, too, so that not just talk about the here and now but how we move forward with things, and again we want to work with our vehicle manufacturers, with all of you, and with NHTSA, but there's no reason to delay.

Senator FISCHER. Thank you very much.

Senator Klobuchar, you are recognized.

**STATEMENT OF HON. AMY KLOBUCHAR,  
U.S. SENATOR FROM MINNESOTA**

Senator KLOBUCHAR. Very good. Thank you very much, Senator Fischer, and thank you to our witnesses, and I really appreciate what you're doing, and I especially wanted to acknowledge you, Ms. Taylor, for your advocacy.

I worked a lot with MADD in my former job as a prosecutor and actually passed our first felony drunk driving bill and the fact that you're willing to share such a horrendous story to save others' lives, I really appreciate. So thank you.

And so I wanted to start out with really I think that as we look at this, we look at these innovations in technology, we know that in the right hands and with the right training, they can be good things.

Mr. Sarkar, in your testimony, you note that automatic braking can reduce front-to-rear crash injuries by 56 percent. However, these features are usually optional, I know this having looked for cars recently, rather than standard, and they're an additional cost. So, you know, forget about people that can afford it trying to do it.

How are we eventually going to make these big safety features available to lower-income populations?

Mr. SARKAR. Senator Klobuchar, thank you for the question.

I think in response to that, I mean, many of these technologies are still at the forefront of being deployed into the marketplace and like many technologies, the more deployment you get and the more scale you get, the lower the cost of these technologies and the greater the ability to deploy them in mass.

And so our focus at ACM is to try to help accelerate the validation of these technologies across a wider spectrum of companies and suppliers making more readily available the technologies and

with increasing competition and choices that also helps to drive down the cost of these solutions into the marketplace.

So I think it's really about moving forward with purpose and trying to test more rapidly and validate these technologies for broader deployment across more cars.

Senator KLOBUCHAR. And what more do you think we can do to ensure that we have proper safeguards to prevent misuse of AV so that AV can live up to the promise of that enhanced safety? I think that's something that's on people's minds a lot.

Mr. SARKAR. I do agree, and I think that validation has to be viewed from more than one dimension.

Oftentimes we think of testing a technology to see whether the automation features work. For example, if a pedestrian walks in front, will the car stop? We don't often think about what the human factor interactions are, the consumer behavior, how consumers interact with these technologies and understand the readiness and capabilities of these technologies, and so we see a lower level of trust because people are seeing the results of potential misuse of technologies or maybe over-reliance on these.

So I think that there needs to be an increased focus on validating not only what happens in the vehicle systems outside the car but what happens inside the car and to do more purposeful research and studies through NHTSA and other organizations to actually understand human factors and consumer behavior and then make sure that the designs represent, you know, consumer-centric usage of these technologies, not just technology-centric applications of these assist features.

Senator KLOBUCHAR. Very good. Mr. Bozzella, in your testimony, you note that the "key to building consumer acceptance is consumer education."

So in your view, what can we do to ensure that consumers are getting that education so that they can safely use this technology?

Mr. BOZZELLA. Yes, thank you, Senator.

A couple of things. One is I do think it's important, as I mentioned earlier in response to Senator Fischer's question, to update and modernize NCAP because that is an important source of information for consumers.

Second, I think it's really important. You note questions about consumer acceptance of technologies on the road today. As you know, there are no highly automated vehicles on the road, only vehicles that require the driver to be engaged in the driving task and yet we see some concerns.

This is why we announced today driver monitoring principles to go with ADAS systems, in other words, automated driver assist systems, to make sure that consumers have the confidence and the awareness of not only what these systems do but what their limitations are, as well, and these principles are comprehensive.

They also address things like what we call these technologies and what we call them ought to be rationally related to how they work and what their limitations are and they address questions about dealing with misuse as we design, and abuses as we design the systems.

So I think driver monitoring and the work that we're doing is really an important step in improving consumer awareness and consumer acceptance of technologies on the road today.

Senator KLOBUCHAR. Thank you.

And I've done a lot on distracted driving, passing legislation on this, care a lot about this. I'll ask those questions on the record in deference to my fellow Senator.

So thank you all very much, and thank you for holding this hearing, Senator Peters.

Senator PETERS. Well, thank you, Senator Klobuchar.

Senator KLOBUCHAR. Thank you, Senator Fischer, for taking over.

Senator PETERS. Thank you, Senator Klobuchar.

Senator Blumenthal, you're recognized for your questions.

**STATEMENT OF HON. RICHARD BLUMENTHAL,  
U.S. SENATOR FROM CONNECTICUT**

Senator BLUMENTHAL. Thank you, Senator Peters. Thank you for all your good work on transportation through this committee and in our Senate.

As you know, earlier this month, a 2019 Tesla Model S crashed into a tree killing two men in Spring, Texas. According to the reports, investigators are, quote unquote, hundred percent certain that no one was in the driver's seat at the time of the crash. Minutes before the crash, the wives of the men were said to overhear them talking about the autopilot feature of the vehicle.

In 2019, more than 39,000 people were killed in motor vehicle crashes. This most recent crash is the latest in a rash of accidents, 28, that NHTSA is investigating involving a Tesla car. That is not necessarily connected to the other 30,000 or plus crashes that have occurred, but *Consumer Reports* recently conducted a test showing that Tesla's vehicles can be easily tricked into thinking that there's someone behind the wheel even when there isn't.

I was very disappointed that Tesla, through its CEO, took to Twitter to downplay the involvement of the company's advanced driver assistance system before both the NTSB and NHTSA have completed their ongoing investigation into the deadly accident.

Tesla's crash highlights that there are many unanswered questions regarding the technology that purports to be automated and, sadly, there are no current regulations to provide the public with a lot of comfort that more automation without significantly upgraded consumer protection is the answer.

So I'd like to ask all of the witnesses what steps should Federal regulators take to address the concern among consumers about the safety of advanced driver assistance systems?

Mr. BOZZELLA. Senator, I'm happy to start and if that's OK.

First, I think it's important to make clear that I know of no vehicles in the U.S. marketplace today that are self-driving vehicles. Every vehicle I know of in the U.S. marketplace today requires the driver to be completely engaged in the driving task at all times.

Highly automated vehicles are important to our future and their regulation is necessary to develop new Federal motor vehicle standards.

This issue that we're discussing now, and I agree with you, is one of consumer awareness and consumer confidence. This is why we outlined these driver monitoring principles today.

Senator BLUMENTHAL. And just to interrupt you maybe to clarify the question.

You know, we're going through a process now with vaccines. The FDA certified them on an emergency use basis because we are in the midst of an emergency for wide dissemination and implementation, and then they reviewed the Johnson & Johnson vaccine when there was question about them. So confidence, trust, very important. Federal regulators there are imposing oversight and scrutiny.

What should Federal regulators do here?

Mr. BOZZELLA. Yes, Senator, these vehicles are clearly already subject to NHTSA's investigative and defect authority. That's really important. They are already on the road. Drivers need to be engaged in the driving task.

We think an important next step, and I believe, based on legislation you've introduced recently that we share both a diagnosis of one of the challenges as well as potential solution, the driver monitoring is an important element of this and so we want to work with the regulators and with policymakers like yourself, my home state Senator, to move that initiative forward.

Senator BLUMENTHAL. Thank you. Others?

Ms. WILSON. Thank you, Senator.

We would actually like to work with our customers and with you on exactly that, but I think one of the things that we need to watch out for, and I think the vaccine case that you mentioned is a good example, these automated technologies also are building blocks of safety.

So when you listen to Ms. Abbas Taylor's very moving testimony and she talks about the kinds of technologies we can put on vehicles now that could save lives, they are automated technologies, and so we really would like to see both them out there more, so why we support NCAP, and then a roadmap of how we work for either mandates or other ways that they move forward.

This will allow consumers to get more understanding of this, but I share your concern. I had an argument over a dinner table with an owner of a Tesla who said he put it on autopilot and I said, well, that's not possible, and she did not believe me, but, you know, I think I share your concern about this and it is a real concern.

So we think that NHTSA can do more and should do more. As we've said, they've lost momentum, but I know that we join with our customers and we'd be willing to work with you on the right steps forward.

Senator BLUMENTHAL. Thank you very much.

Mr. Chairman, I'd just like to submit for the record the statement of Katherine Chase, President of Advocates for Highway and Auto Safety.

Senator PETERS. Without objection.

Senator BLUMENTHAL. Thank you.

[The information referred to follows:]



PREPARED STATEMENT OF CATHERINE CHASE, PRESIDENT,  
ADVOCATES FOR HIGHWAY AND AUTO SAFETY

### Introduction

Advocates for Highway and Auto Safety (Advocates) is a coalition of public health, safety, law enforcement and consumer organizations, insurers and insurance agents that promotes highway and auto safety through the adoption of Federal and state laws, policies and regulations. Advocates is unique both in its board composition and its mission of advancing safer vehicles, safer motorists and road users, and safer infrastructure. We respectfully request this statement be included in the hearing record.

According to the National Highway Traffic Safety Administration (NHTSA), 36,096 people were killed and an estimated 2.81 million more were injured in traffic crashes in 2019.<sup>1</sup> NHTSA currently values each life lost in a crash at \$11.6 million.<sup>2</sup> The crashes, injuries, and fatalities impose a financial burden of well over \$800 billion in total costs to society—\$242 billion of which are direct economic costs, equivalent to a “crash tax” of \$784 on every American.<sup>3</sup> When adjusted solely for inflation, total costs reach nearly a trillion dollars annually. In 2018, crashes alone cost employers \$72.2 billion.<sup>4</sup>

Adding to this burden are serious and fatal crashes involving vehicles with autonomous capabilities which are occurring with alarming frequency. Only ten days ago, a crash involving a Tesla Model S in Houston claimed the lives of both of its occupants. Officials at the scene reported that it was traveling at “a high rate of speed” while “no one was driving the vehicle at the time of the crash.”<sup>5</sup> In fact, investigators believe neither occupant was in the driver’s seat at the time of the crash.<sup>6</sup> Moreover, NHTSA recently disclosed that it currently has 23 active investigations of crashes involving Tesla vehicles, at least three of which are recent including the Houston crash.<sup>7</sup> In addition, the recent fatal Tesla crash has raised yet more concerns about the worrisome pattern of incidents involving these systems such as the inability to ensure the human operator remains engaged in the driving task and proper safeguards to prevent misuse.<sup>8</sup> With the tragic and notable exception of the fatal Uber crash, these crashes have not killed people outside of the vehicles.<sup>9</sup> However, without needed safeguards, it seems only a matter of time until these vehicles crash not only into police cruisers and fire trucks, but also into actual first responders and other innocent road users.<sup>10</sup> Rather than waiting for this *fait accompli*, Congress must enact legislation to require regulation of the technology.

In sharp contrast to the deadly Tesla crash was the crash involving Tiger Woods, a prime example of the lifesaving benefits of regulations. Mr. Woods’ life was saved, at least in part, by a seat belt, air bags and roof crush performance standards, all of which are required as standard equipment in cars. As *Auto Week* succinctly explained, “The details of Tiger Woods’ crash are still being sorted out by investigators, but in general, the world’s greatest golfer can thank more than 50 years of government-mandated safety advances that he is alive.”<sup>11</sup>

<sup>1</sup> Traffic Safety Facts Research Note: Overview of Motor Vehicle Crashes in 2019, NHTSA, Dec. 2020, DOT HS 813 060. Statistics are from the U.S. Department of Transportation unless otherwise noted.

<sup>2</sup> John Putnam, U.S. DOT Deputy General Counsel, Guidance on the Treatment of the Economic Value of a Statistical Life (VSL) in U.S. Department of Transportation Analyses—2021 Update.

<sup>3</sup> “The Economic and Societal Impact of Motor Vehicle Crashes, 2010,” NHTSA (2015).

<sup>4</sup> Cost of Motor Vehicle Crashes to Employers 2019, Network of Employers for Traffic Safety, March 2021.

<sup>5</sup> Bryan Pietsch, No Driver in Tesla Crash That Killed 2, Officials Say, NY Times (Apr. 9, 2021).

<sup>6</sup> *Id.*

<sup>7</sup> David Shepardson, U.S. safety agency reviewing 23 Tesla crashes, three from recent weeks, Reuters (Mar. 18, 2021).

<sup>8</sup> Rebecca Elliot, Congressmen, Consumer Reports Raise Concerns Over Tesla’s Autopilot, Wall Street Journal (Apr. 22, 2013).

<sup>9</sup> NTSB, Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian Tempe, Arizona, March 18, 2018, Report No.: NTSB/HAR-19/03 (Nov. 19, 2019).

<sup>10</sup> Clifford Atiyeh, NHTSA Investigating Indiana Crash Where Tesla Model 3 Hit Fire Truck, Car and Driver (Jan. 11, 2020); Alex Kierstein, Tesla on “Autopilot” Slams Into Stationary Michigan Cop Car, Motor Trend (Mar. 17, 2021).

<sup>11</sup> Mark Vaughn, Tiger Woods Owes His Life to Decades of Government Safety Standards, Auto Week (Feb 26, 2021).

### **Advocates Consistently Promotes Proven Technology to Prevent Crashes and Save Lives**

Advocates always has enthusiastically championed proven vehicle safety technology and for good reason—it is one of the most effective strategies for preventing deaths and injuries. NHTSA has estimated that between 1960 and 2012, over 600,000 lives have been saved by motor vehicle safety technologies.<sup>12</sup> In 1991, Advocates led the coalition that supported enactment of the bipartisan Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991<sup>13</sup> which included a mandate for front seat airbags as standard equipment. As a result, by 1997, every new car sold in the United States was equipped with this technology and the lives saved have been significant. Airbags have saved an estimated 50,457 lives from 1987 to 2017, according to NHTSA.<sup>14</sup>

Advocates continued to support proven lifesaving technologies as standard equipment in all vehicles in other Federal legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;<sup>15</sup> rear outboard 3-point safety belts;<sup>16</sup> electronic stability control;<sup>17</sup> rear safety belt reminder systems;<sup>18</sup> brake transmission interlocks;<sup>19</sup> safety belts on motorcoaches;<sup>20</sup> electronic logging devices for commercial motor vehicles (CMVs)<sup>21</sup>; and, rear-view cameras.<sup>22</sup>

Further, Advocates has been a leading safety voice in the fight against alcohol-impaired driving. Our organization supported the development of breathalyzer technology which is essential to enforcement of impaired driving laws and keeping drunk drivers off the road. Additionally, together with Mothers Against Drunk Driving (MADD), Advocates was a leading supporter in Federal and state efforts to reduce blood alcohol concentration (BAC) laws from .10 to .08 percent and achieve a national law.<sup>23</sup> Lastly, Advocates has long supported a .05 percent BAC threshold for drunk driving and the enactment of all-offender ignition interlock device (IID), child endangerment and open container laws.<sup>24</sup>

### **Advanced Driver Assistance Systems (ADAS): Proven Technology that Can Prevent Crashes and Save Lives**

Every day on average, over 100 people are killed and nearly 7,500 people are injured in motor vehicle crashes. Compounding this tragedy is the fact that proven solutions are currently available that can prevent or mitigate most crashes. Advocates remains optimistic that in the future AVs may bring about meaningful and lasting reductions in motor vehicle crashes. However, that potential remains far from a near-term certainty or reality. As Dr. M. L. Cummings, the well-known and well-respected Director of the Humans and Autonomy Lab, Pratt School of Engineering, Duke University, notes in *Rethinking the maturity of artificial intelligence in safety-critical settings*:

While AI augmentation of humans in safety-critical systems is well within reach, this success should not be mistaken for the ability of AI to replace humans in such systems. Such a step is exponential in difficulty and with the inability of machine learning, or really any form of AI reasoning, to replicate top-down reasoning to resolve uncertainty, AI-enabled systems should not be operating in safety critical systems without significant human oversight.<sup>25</sup>

<sup>12</sup>Lives Saved by Vehicle Safety Technologies and Associated Federal Motor Vehicle Safety Standards, 1960 to 2012, DOT HS 812 069 (NHTSA, 2015); See also, NHTSA AV Policy, Executive Summary, p. 5 endnote 1.

<sup>13</sup>Pub. L. 102-240 (Dec. 18, 1991).

<sup>14</sup>Traffic Safety Facts 2018, A Compilation of Motor Vehicle Crash Data, DOT HS 812 981, NHTSA (Nov. 2020).

<sup>15</sup>Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Pub. L. 106-414 (Nov. 1, 2000).

<sup>16</sup>Anton's Law, Pub. L. 107-318 (Dec. 4, 2002).

<sup>17</sup>Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59 (Aug. 10, 2005).

<sup>18</sup>*Id.*

<sup>19</sup>*Id.*

<sup>20</sup>Moving Ahead for Progress in the 21st Century (MAP-21) Act, Pub. L. 112-141 (Jan. 3, 2012).

<sup>21</sup>*Id.*

<sup>22</sup>Cameron Gulbransen Kids Transportation Safety Act of 2007, Pub. L. 110-189 (Feb. 28, 2008).

<sup>23</sup>Department of Transportation and Related Agencies Appropriations, 2001. Pub. L. 106-346 (Oct. 23, 2000).

<sup>24</sup>Advocates for Highway and Auto Safety, 2020 Roadmap of State Highway Safety Laws (Jan. 2020).

<sup>25</sup>Cummings, M.L., "Rethinking the maturity of artificial intelligence in safety-critical settings," AI Magazine, in review.

Yet, on the path to the future possibility of AVs, advanced driver assistance systems (ADAS) can prevent and lessen the severity of crashes now. The National Transportation Safety Board (NTSB) has included increasing implementation of collision avoidance technologies in its Most Wanted Lists of Transportation Safety Improvements since 2016.<sup>26</sup> It is a transformational time in transportation innovation with the availability of new safety technologies in vehicles to prevent or mitigate crashes and protect occupants and road users.

Currently available proven collision avoidance systems include automatic emergency braking (AEB), lane departure warning (LDW), blind spot detection (BSD), rear AEB and rear cross-traffic alert. The Insurance Institute for Highway Safety (IIHS) has found that:

- AEB can decrease front-to-rear crashes with injuries by 56 percent;
- LDW can reduce single-vehicle, sideswipe and head-on injury crashes by over 20 percent;
- BSD can diminish injury crashes from lane change by nearly 25 percent;
- Rear AEB can reduce backing crashes by 78 percent when combined with rear-view camera and parking sensors; and,
- Rear cross-traffic alert can reduce backing crashes by 22 percent.<sup>27</sup>

However, the widespread distribution of these technologies is hamstrung by members of the auto industry which are selling them as part of an additional, expensive trim package along with other non-safety features, or including them as standard equipment in high end models or vehicles. This practice both slows mass deployment and inequitably provides access only to those who can afford an upcharge of thousands of dollars. Moreover, there are currently no minimum performance standards to ensure the technologies execute as expected and needed.

Furthermore, an industry work-around to technology requirements which give an illusion of advancement is a voluntary agreement. Time and again these have been demonstrated to be ineffective as most recently evidenced by the March 2016 voluntary agreement among 20 automakers to have AEBs in most new light vehicles by 2023. As of December 2020, two manufacturers, accounting for nearly a third of the U.S. auto market, demonstrate this lackluster response to the detriment of public safety. Only 46 percent of General Motors vehicles and 13.5 percent of Fiat Chrysler vehicles were sold with AEB between September 1, 2019 through August 31, 2020. Moreover, the performance requirements in the agreement are exceptionally weak and consequently can result in these systems not performing as well as they should. Additionally, at any time, an automaker could decide it no longer wants to comply with the agreement without any ramifications.

It should also be noted that IIHS found that equipping large trucks with AEB and FCW could eliminate more than two out of five crashes in which a large truck rear-ends another vehicle.<sup>28</sup> Considering that in 2019 over 5,000 people were killed and 159,000 people were injured in crashes involving a large truck,<sup>29</sup> Congress should take swift action to require the U.S. DOT to issue a safety standard by a date certain requiring this essential equipment in new trucks.

Additionally, more than 990 children have died in hot cars since 1990. Inexpensive technology is available today that can detect the presence of an occupant in a car and engage a variety of alerts in the form of honking horns, flashing lights, dashboard warnings or text messages. Such detection systems may have other useful applications. For example, this type of technology could detect whether occupants are properly restrained and may satisfy requirements for occupant protection. In fact, the Moving Ahead for Progress in the 21st Century (MAP-21) Act (Pub. L. 112-141) directed the U.S. DOT to issue a rule requiring rear seat belt reminders in all new cars by October 2015. This regulation, which is long overdue, could be potentially met by an occupant detection sensor. In the future this type of technology also could communicate to an AV system that the car is occupied and if occupants are restrained properly.

<sup>26</sup> NTSB Most Wanted List Archives, [https://ntsb.gov/safety/mwl/Pages/mwl\\_archive.aspx](https://ntsb.gov/safety/mwl/Pages/mwl_archive.aspx)

<sup>27</sup> IIHS, Real world benefits of crash avoidance technologies, available at: <https://www.iihs.org/media/259e5bbd-f859-42a7-bd54-3888f7a2d3ef/e9boUQ/Topics/ADVANCED%20DRIVER%20ASSISTANCE/IIHS-real-world-CA-benefits.pdf>

<sup>28</sup> Teoh, E, Effectiveness of front crash prevention systems in reducing large truck crash rates, IIHS (Sep. 2020).

<sup>29</sup> Traffic Safety Facts: Research Note; Overview of Motor Vehicle Crashes in 2019, NHTSA, Dec. 2020, DOT HS 813 060.

Legislation passed by the U.S. House of Representatives in July 2020, the Moving Forward Act,<sup>30</sup> would achieve the goal of providing lifesaving technologies as standard equipment on new vehicles. Additional legislation which also promotes these issues include: Protecting Roadside First Responders Act (116th Congress, S. 2700/H.R. 4871)(cosponsored by Committee Member Sen. Tammy Duckworth (D-IL)); 21st Century Smart Cars Act (116th Congress, H.R. 6284); Safe Roads Act (116th Congress, H.R. 3773); School Bus Safety Act (116th Congress, S. 2278/H.R. 3959)(sponsored by Committee Member Sen. Tammy Duckworth (D-IL)); Stay Aware for Everyone Act (116th Congress, S. 4123)(sponsored by Committee Members Sens. Richard Blumenthal (D-CT) and Ed Markey (D-MA)); Five-Stars for Safe Cars Act (116th Congress, H.R. 6256); and the Hot Cars Act (116th Congress, H.R. 2593), among others. These measures should be included in any surface reauthorization legislation.

On the path to AVs, requiring minimum performance standards for these foundational technologies will ensure the safety of all road users while also building consumer confidence in the capabilities of these newer crash avoidance technologies.

### **Impaired Driving is a Significant Threat to Public Safety, Yet Available Technology Can Combat this Preventable Danger**

In 2019, over 10,000 people were killed in crashes involving impaired driving across the Nation.<sup>31</sup> According to NHTSA, the estimated economic cost of all alcohol-impaired crashes in the United States in 2010 (the most recent year for which cost data is available) was \$44 billion.<sup>32</sup> When inflation rates are factored into this figure, the annual cost is \$55.5 billion. In 2018, alcohol-impaired crashes cost employers \$8.0 billion.<sup>33</sup> Recognizing the serious danger posed to the public by drunk drivers, the NTSB included ending alcohol and other drug impairment in its 2021–2022 Most Wanted List of Transportation Safety Improvements.<sup>34</sup> In addition, the Centers for Disease Control and Prevention (CDC) has decried the human and financial costs associated with impaired driving noting several commonsense preventative measures including the implementation of ignition interlock devices (IIDs).<sup>35</sup>

The problem of impaired driving is far from a new issue for automobile manufacturers. In fact, the industry has been working on a technological solution to drunk driving since at least the 1970s.<sup>36</sup> In 2007, a major manufacturer announced it was developing an alcohol detection system, but over a decade later the technology is still not in vehicles.<sup>37</sup> This tortured history, replete with the preventable fatalities of 10,000 people per year on average, demonstrates that a system to prevent impaired driving will not be in new vehicles until NHTSA issues a Federal standard requiring such action.

Technology for driver monitoring, eye tracking, hands-on-the-wheel detection, and other indicators is already being developed, and even installed by some manufacturers, to target many key crash causes such as impairment, distraction, and drowsy driving.<sup>38</sup> In fact, a feature in *MADDvocate*, “*Tragedy Inspires a New Direction for Advanced Drunk Driving Prevention Technology*,” recounted information from industry sources that “the technology has been available for six or seven years. But, . . . will only become available if the government mandates it.”<sup>39</sup> The IIHS conducted research showing that impairment detection systems could save upwards of 9,000 lives each year.<sup>40</sup>

We commend Committee Members Senators Ben Ray Lujan (D-NM) and Rick Scott (R-FL) for their leadership and dedication to curb impaired driving by intro-

<sup>30</sup>The Moving Forward Act, H.R. 2, 116th Cong., 2nd Sess. (2020).

<sup>31</sup>*Id.*

<sup>32</sup>Traffic Safety Facts: 2018 Data; Alcohol-Impaired Driving, NHTSA, Dec. 2019, DOT HS 812 864.

<sup>33</sup>Cost of Motor Vehicle Crashes to Employers 2019, Network of Employers for Traffic Safety, March 2021.

<sup>34</sup>NTSB, 2019–2020 Most Wanted List of Transportation Safety Improvements.

<sup>35</sup>Centers for Disease Control, Transportation Safety, Impaired Driving, available at: [https://www.cdc.gov/transportationsafety/impaired\\_driving/impaired-driv\\_factsheet.html](https://www.cdc.gov/transportationsafety/impaired_driving/impaired-driv_factsheet.html)

<sup>36</sup>Thomas A. DeMauro, A GM onboard experimental alcohol and drug impairment detection device of the 1970s, Hemmings (Jan. 16, 2019).

<sup>37</sup>Associated Press, Toyota creating alcohol detection system (Jun. 3, 2007).

<sup>38</sup>Andrew J. Hawkins, Volvo will use in-car cameras to combat drunk and distracted driving, *The Verge* (Mar. 20, 2019); Christian Wardlaw, How Subaru’s Driver Focus Works, *Kelley Blue Book* (Sep. 25, 2020); Lexus Introduces World’s First Driver Monitoring System, *Bloomberg* (Sep. 7, 2007). Additional automakers are introducing driver monitoring systems as part of SAE level 2 and 3 automated driving systems.

<sup>39</sup>MADD, *MADDvocate*, Fight For a Future of No More Victims, pg. 10 (Dec. 2020).

<sup>40</sup>Insurance Institute for Highway Safety, Alcohol-detection systems could prevent more than a fourth of U.S. road fatalities (Jul. 23, 2020).

ducing the Reduce Impaired Driving for Everyone (RIDE) Act.<sup>41</sup> This bipartisan legislation will ensure that verified technology to passively detect impairment and prevent driving is standard in new cars. We urge this Committee and Congress to advance this legislation.<sup>42</sup> With each passing hour, another person is killed in an alcohol-impaired driving fatality, on average.<sup>43</sup>

**Autonomous Vehicles: Unproven Technology that Must be Subject to Government Oversight to Ensure Public Safety**

While AVs may someday in the future bring about benefits to society including reductions in motor vehicle crashes, these potentials remain far from a certainty. Congress must not continue a “hands off” approach to “hands-free” driving. Commonsense safeguards and regulations are essential.

*The Artificial Rush to Pass Federal Legislation Enabling Mass Exemptions from Safety Standards and the Use of Fear Tactics to Propel It*

Federal safety standards have been established using thorough objective research, scientific studies and data. They are also subject to a robust and transparent public process and ensure the safety and security of all road users. No demonstrable evidence has been presented to show that the development and deployment of AVs requires larger volumes of exemptions from Federal safety standards which are essential to public safety. In fact, since the first AV bill was introduced in 2017, AV development has not come to a grinding halt. For example, in December 2020, General Motors announced it was launching self-driving cars on the streets of San Francisco.<sup>44</sup> In February 2021, Ford announced it was investing seven billion dollars in AV technology through 2025.<sup>45</sup>

Moreover, current law already permits manufacturers to apply for an unlimited number of exemptions. For each exemption granted, manufacturers can sell up to 2,500 exempt vehicles. Advocates strongly opposes any change to this law. Allowing huge numbers of exempt vehicles on the road (potentially millions) de facto turn everyone—in and around these vehicles—into unknowing and unwilling human subjects in a risky experiment. Allowing a massive influx of new vehicles exempt from FMVSS will have serious, costly and potentially deadly ramifications, both those that can be predicted or some that cause unintended consequences.

Responding affirmatively to an artificial rush to pass legislation that provides tens of thousands of exemptions from current FMVSS, fueled by AV manufacturers wanting to be the first to market and recoup their substantial investments which already surpass \$100 billion, could significantly undermine safety as well as public acceptance and the ultimate success of these vehicles.<sup>46</sup> Numerous industry executives and technical experts have stated that the technology is not ready now and may not be ready for years ahead. “We’ve had multiple years of claims that ‘by the end of the year it’s going to be magically self-driving by itself without a human in the car,’” Ford’s autonomous vehicles head, John Rich, said at a recent Princeton University conference. “It is not helpful, OK? It is confusing the public. Frankly even the investor community is very, very confused as to what paths are plausible and what the capabilities of the different systems are.”<sup>47</sup> In June of 2019, Gill Pratt, Director of the Toyota Research Institute said, “None of us have any idea when full self-driving will happen.”<sup>48</sup> Bryan Salesky, CEO of Argo AI, said in July of 2019, “Level 5 as it’s defined by the SAE levels is a car that can operate anywhere—no geographic limitation. We’re of the belief, because we’re realistic, that Level 5 is going to be a very long time before it’s possible. I’m not saying that Level 5 isn’t possible but it is something that is way in the future.”<sup>49</sup> John Krafcik, CEO

<sup>41</sup> S. 1331, 117th Congress, 1st Sess. (2021).

<sup>42</sup> NHTSA.gov; See also Pub. L. 91-605 (1970).

<sup>43</sup> National Center for Statistics and Analysis. (2019, December). Alcohol impaired driving: 2018 data (Traffic Safety Facts. Report No. DOT HS 812 864). Washington, DC: National Highway Traffic Safety Administration.

<sup>44</sup> Faiz Siddiqui, Cruise putting driverless cars on San Francisco streets for first time, Wash. Post (Dec. 9, 2020).

<sup>45</sup> Roberto Baldwin, Ford Makes \$29 Billion Commitment to Electric and Self-Driving Cars, Car and Driver (Feb. 5, 2021).

<sup>46</sup> Cummings, M.L., “Rethinking the maturity of artificial intelligence in safety-critical settings,” AI Magazine, (in review), citing Eisenstein, P. A. 2018. “Not everyone is ready to ride as autonomous vehicles take to the road in ever-increasing numbers.” CNBC.

<sup>47</sup> Russ Mitchell, Two die in driverless Tesla incident. Where are the regulators?, L.A. Times (Apr. 19, 2021).

<sup>48</sup> Lawrence Ulrich, Driverless Still a Long Way From Humanless, N.Y. Times (Jun. 20, 2019).

<sup>49</sup> Level 5 possible but “way in the future”, says VW-Ford AV boss, Motoring (Jun. 29, 2019).

of Waymo, said in late 2018, “This is a very long journey. It’s a very challenging technology and we’re going to take our time. Truly every step matters.”<sup>50</sup>

Some proponents of advancing the deployment of AVs contend the U.S. is falling behind other nations. However, this fear-inducing claim is misleading as other countries are taking a more calculated, careful and cautious approach. For example, Germany requires a human to be behind the wheel of a driverless car in order to take back control and has other important elements including requirements for vehicle data recording.<sup>51</sup> In the United Kingdom, testing has largely been limited to a handful of cities, and the government has proposed and published a detailed code of practice for testing AVs.<sup>52</sup> In Canada, several provinces prohibit certain types of AVs from being sold to the public.<sup>53</sup> In Asia, Japan has allowed on-road testing with a driver behind the wheel and is currently working on regulatory and legal schemes for controlling the commercial introduction of AVs, but even so has not begun to address the highest levels of automation.<sup>54</sup> In China, all AV operations remain experimental.<sup>55</sup> In sum, no country is selling fully automated vehicles to the public and by many accounts, none will be for a significant amount of time.<sup>56</sup> The U.S. is not behind other countries in allowing them to go to market, but we are behind in establishing comprehensive safeguards to ensure that this progress happens without jeopardizing or diminishing public safety.

*The Dangerous Shortcomings of the Current State of the Technology*

Several serious crashes involving cars equipped with autonomous technology have already occurred, many of which have been subject to investigation by the NTSB. These investigations have and will continue to identify safety deficiencies, determine contributing causes, and recommend government and industry actions to prevent future deadly incidents. As stated by NTSB Chairman Robert Sumwalt during a November 19, 2019, meeting, “our entire purpose for being here is to learn from tragic events like this so that they can be prevented in the future . . . This investigation has the ability to have far reaching implications down the road.”<sup>57</sup>

During this meeting, the NTSB considered the probable cause of the tragic crash that occurred on March 18, 2018, in Tempe, Arizona, in which Elaine Herzberg was killed by an Uber test vehicle equipped with self-driving features. Among the key issues the NTSB identified was the glaring need for sensible safeguards, protocols and regulations for AVs which are not yet being sold but are being tested on public roads. Basic safeguards are urgently needed as the NTSB also emphasized that a dearth of a safety culture at Uber contributed to this tragic outcome. Although Uber may have taken some responsive actions following the Arizona crash, it is unclear whether they are sufficient to prevent another fatal crash. Additionally, there is absolutely no assurance about the adequacy of the safety culture of numerous other companies developing and testing AVs on public roads. Some relevant and compelling quotes from the NTSB hearing buttress the views of consumer and safety groups:

The lessons of this crash do not only apply to Uber ATG [Advanced Technologies Group] and they’re not limited to just simply something went wrong and now it’s fixed. Rather, it’s something went wrong and something else might go wrong unless its prevented . . . This crash was not only about Uber ATG test drive in Arizona, this crash was about testing the development of automated driving systems on public roads. Its lessons should be studied by any company testing in any state. If your company tests automated driving systems on public roads, this crash, it was about you. If you use roads where automated driving systems are being tested, this crash, it was about you. And if your work touches on automated driving systems at the Federal or state level, guess what, this crash, it was about you.

—NTSB Chairman Robert Sumwalt<sup>58</sup>

<sup>50</sup> WSJ Tech D.Live Conference (Nov. 13, 2018).

<sup>51</sup> Dentons, Global Guide to Autonomous Vehicles 2020.

<sup>52</sup> *Id.*

<sup>53</sup> *Id.*

<sup>54</sup> Kyodo, JiJi, Cabinet paves way for self-driving vehicles on Japan’s roads next year with new rules, The Japan Times (Sep. 20, 2019).

<sup>55</sup> Dentons, Global Guide to Autonomous Vehicles 2020.

<sup>56</sup> Lawrence Ulrich, Driverless Still a Long Way From Humanless, N.Y. Times (Jun. 20, 2019); Level 5 possible but “way in the future”, says VW-Ford AV boss, Motoring (Jun. 29, 2019).

<sup>57</sup> NTSB Board Meeting: Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian (Nov. 19, 2019).

<sup>58</sup> *Id.*

NHTSA's mission is to save lives, first and foremost, to prevent injuries and to reduce economic costs due to road traffic crashes through education, research, safety standards, which we are lacking here, and enforcement activity but first and foremost it's to save lives . . . In my opinion, they have put technology advancement here before saving lives.

—NTSB Board Member Jennifer Homendy<sup>59</sup>

Advocates urges Congress to heed critical information from our Nation's pre-eminent crash investigators. Findings from all these investigations should be released and incorporated as applicable into any proposed legislation. The findings are essential to developing sound and safe public policies.

*Safeguards Necessary to Protect Public Safety in the Deployment of AVs*

Advocates and numerous stakeholders have developed the "AV Tenets," policy positions which should be a foundational part of any AV policy.<sup>60</sup> It has four main, commonsense categories including: (1) prioritizing safety of all road users; (2) guaranteeing accessibility and equity; (3) preserving consumer and worker rights; and, (4) ensuring local control and sustainable transportation. Many promises have been made about AVs bringing reductions in motor vehicle crashes and resultant deaths and injuries, traffic congestion and vehicle emissions. Additionally, claims have been made that AVs will expand mobility and accessibility, improve efficiency, and create more equitable transportation options and opportunities. Without the commonsense safeguards in the AV Tenets, the possibilities are imperiled at best and could be doomed at worst. Additionally, the absence of protections could result in adverse effects including safety risks for all people and vehicles on and around the roads. Requiring that AVs meet minimum standards and that operations are subject to adequate oversight will save lives and boost consumer confidence in this burgeoning technology.

Additionally, federal, state and local roles in the oversight of motor vehicles and traffic safety laws should not be drastically altered by Congress. The statutory mission of the U.S. DOT established by Congress in 1966 is to regulate the performance of motor vehicles to ensure public safety, which now includes automated driving system technology and AVs.<sup>61</sup> For more than 50 years, the U.S. DOT, through the NHTSA, has issued safety performance standards for passenger and commercial motor vehicles. The role of states is to regulate road safety by the passage of traffic safety laws. However, in the absence of comprehensive and strong minimum Federal standards and regulations, the states retain a legal right and a duty to its citizens to develop proposals and implement solutions to ensure public safety. Legislation should not attempt to prohibit states, in any way, from advancing AV safety in the absence of Federal rules. In fact, during the November 19, 2019, NTSB hearing, Board Member Homendy said, "If you have a void at the Federal level, the states are going to need to fill that because they have to ensure the safety of their citizens." It is confounding that certain proponents of AVs advocate for completely disregarding established law by flipping the concept of preemption on its head in order to limit the rights of state and local governments to protect their citizens.

Lastly, numerous public opinion polls show a high skepticism and fear about the technology, and for good reason. For example, a public opinion poll conducted by the American Automobile Association (AAA) last month found that that only 22 percent of people feel manufacturers should focus on developing AVs while a majority (58 percent) want safety systems such as AEB in their next vehicle.<sup>62</sup> According to a January 2020 public opinion poll conducted by ORC International, an overwhelming majority of respondents expressed concern about sharing the road with driverless vehicles as motorists, bicyclists and pedestrians.<sup>63</sup> In addition, an April 2019 Reuters/Ipsos opinion poll found that 64 percent of Americans said they would not buy a self-driving car.<sup>64</sup> Further, 71 percent of U.S. drivers surveyed by the American Automobile Association (AAA) in March of 2019 would be afraid to ride in a fully self-driving vehicle.<sup>65</sup> Any legislation should take into account and be responsive to these critical findings about public attitudes.

<sup>59</sup> *Id.*

<sup>60</sup> The AV Tenets are attached as Appendix A.

<sup>61</sup> National Traffic and Motor Vehicle Safety Act of 1966, Pub. L. 89-563 (1966)

<sup>62</sup> Ellen Edmonds, AAA: Today's Vehicle Technology Must Walk So Self-Driving Cars Can Run, AAA (Feb. 25, 2021)

<sup>63</sup> ORC International and Advocates for Highway and Auto Safety, CARAVAN Public Opinion Poll, January 2020.

<sup>64</sup> Americans still don't trust self-driving cars, Reuters/Ipsos poll finds, April 2019.

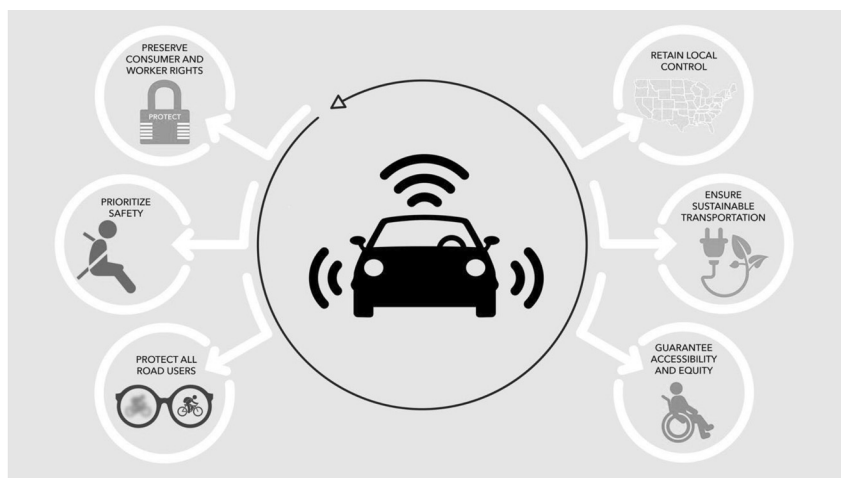
<sup>65</sup> AAA Annual Automated Vehicle Survey, March 2019.

## Conclusion

Fully driverless cars may have a future potential to reduce the carnage on our roads and expand mobility, but commonsense, lifesaving solutions can and must be implemented now. During this transformational time in surface transportation history, we should pay heed to Benjamin Franklin's infamous quote from 1736, "An ounce of prevention is worth a pound of cure." While motor vehicle crashes often involve human behavioral causes, it is essential to remember these same fallible humans are developing AVs. The solution to safety is not to replace one human-error problem with another. Safeguards, transparency and oversight are vital to enable AVs to achieve the promises that have been put forth.

### AUTONOMOUS VEHICLE (AV) TENETS<sup>1</sup>

NOVEMBER 30, 2020



#### *Prioritizing Safety of All Road Users*

**Safety Rulemakings:** All levels of automated vehicles<sup>2</sup> must be subject to comprehensive and strong Federal standards ensuring they are safe and save lives. While the U.S. Department of Transportation (DOT) has the authority to issue motor vehicle safety standards for all levels of automated vehicles, for the last four years, it has abrogated this responsibility by focusing its efforts on inadequate voluntary initiatives. When Congress considers legislation on AVs, it is imperative that the protection of all road users is the guiding principle and that legislation requires the DOT to commence rulemakings on safety standards and issue final rules by a prompt date certain with a reasonable compliance date. The rulemakings must address known and foreseeable safety issues, many of which have been identified by the National Transportation Safety Board (NTSB) and other research institutions, including:

- **Revising Federal Motor Vehicle Safety Standards:** Any actions by the National Highway Traffic Safety Administration (NHTSA, Agency) to revise or repeal existing Federal Motor Vehicle Safety Standards (FMVSS) in order to facilitate the introduction of AVs must be preceded by and conducted in a public rulemaking process and cannot be undertaken by internal Agency actions. Any revision must meet the safety need provided by current standards.

<sup>1</sup>These tenets are limited to vehicles with a gross vehicle weight rating (GVWR) of 10,000 pounds or less unless otherwise noted; however, it is imperative that automated delivery vehicles (including those used on sidewalks and other non-roadways) and commercial motor vehicles be subject to comprehensive regulations, including rules regarding the presence of a licensed, qualified driver behind the wheel.

<sup>2</sup>Partially automated vehicles (SAE International Level 2) and conditional/highly automated vehicles (SAE International Levels 3, 4, 5).



- **Collision Avoidance Systems:** Certain advanced safety technologies, which may be foundational technologies for AVs, already have proven to be effective at preventing and mitigating crashes across all on-road modes of transportation and must be standard equipment with Federal minimum performance requirements. These include automatic emergency braking with pedestrian and cyclist detection, lane departure warning, and blind spot warning, among others. A lack of performance standards has contributed to instances of dangerous malfunctions of this technology, highlighting the need for rulemakings for collision avoidance systems and other fundamental AV technologies. As collision avoidance technology continues to improve and evolve, it should also be required to detect and prevent collisions with all vulnerable road users and objects in the operating environment.
- **“Vision Test” for AVs:** Driverless cars must be subject to a “vision test” to guarantee an AV will operate on all roads and in all weather conditions and properly detect and respond to other vehicles, all people and objects in the operating environment including but not limited to Black and Brown people, pedestrians, bicyclists, wheelchair users and people with assistive technology, children and strollers, motorcycles, roadway infrastructure, construction zones and roadside personnel, and interactions with law enforcement and first responders. Any algorithm that will inform the technology must be free of bias. Risk assessments for AVs must ensure adequate training data which is representative of all users of the transportation system. Manufacturers and developers must be required to meet basic principles in the development and use of algorithms including: the use of algorithms should be transparent to the end users; algorithmic decision-making should be testable for errors and bias while still preserving intellectual property rights; algorithms should be designed with fairness and accuracy in mind; the data set used for algorithmic decision-making should avoid the use of proxies; and, algorithmic decision-making processes that could have significant consumer consequences should be explainable. The DOT must review algorithms and risk assessment procedures for potential issues, and any identified problems must be then corrected by the developer or manufacturer and verified by the DOT. Coordination and oversight should be led by the Office of the NHTSA Civil Rights Director in partnership with the Office of the Assistant Secretary for Research and Technology, NHTSA Office of Vehicle Safety Research, and NHTSA Chief Counsel’s office. The Office of the NHTSA Civil Rights Director should be given adequate resources, expertise and authority to accomplish this role.
- **Human-Machine Interface (HMI) for Driver Engagement:** Research demonstrates that even for a driver who is alert and performing the dynamic driving task, a delay in reaction time occurs between observing a safety problem, reacting and taking needed action. For a driver who is disengaged from the driving task during autonomous operation of a vehicle (*i.e.*, sleeping, texting, watching a movie), that delay will be longer because the driver must first be alerted to re-engage, understand and process the situation, and then take control of the vehicle before taking appropriate action. Therefore, an AV must provide adequate alerts to capture the attention of the human driver with sufficient time to respond and assume the dynamic driving task for any level of vehicle automation that may require human intervention. This mechanism must be accessible to all occupants, including people with disabilities and vulnerable populations.
- **Cybersecurity Standard:** Vehicles must be subject to cybersecurity requirements to prevent hacking and to ensure mitigation and remediation of cybersecurity events. The Federal Aviation Administration (FAA) has a process for the certification and oversight of all U.S. commercial airplanes, including avionics cybersecurity, although improvement is needed according to a recent Government Accountability Office (GAO) study.<sup>3</sup> The DOT should be directed, in cooperation with the National Institute of Standards and Technology (NIST), to develop a cybersecurity standard for automated driving systems. The DOT should then require the cybersecurity standard be applied to all new vehicles. The DOT must be engaged in all relevant discussions on artificial intelligence.
- **Electronics and Software Safety Standard:** Vehicles must be subject to minimum performance requirements for the vehicle electronics and software that power and operate vehicle safety and driving automation systems individually and as interdependent components.

<sup>3</sup>United States Government Accountability Office, Aviation Cybersecurity, FAA Should Fully Implement Key Practices to Strengthen Its Oversight of Avionics Risks, GAO–21–86 (Oct. 2020).

- **Operational Design Domain (ODD):** The NHTSA must issue Federal standards to ensure safeguards for driving automation systems to limit their operation to the ODD in which they are capable of functioning safely. An ODD includes elements such as: the type of roadway, geographical area, speed range, vehicle operating status, and environmental and temporal conditions in which the vehicle is capable of operating safely; any roadway or infrastructure asset required for the operation of the vehicle, such as roadside equipment, pavement markings, signage, and traffic signals; and, the means by which the vehicle will respond if the defined ODD changes or any circumstance which causes vehicle to operate outside of its defined ODD. The rule shall also: specify requirements for how the vehicle will safely transition to a minimal risk condition as a result of a malfunction or when operating outside of the ODD, including the necessity for human intervention that is accessible to all occupants including people with disabilities and vulnerable populations; and, the ability of the vehicle to comply with local laws as part of whether the vehicle is operating inside the ODD.
- **Functional Safety Standard:** Requires a manufacturer to ensure the design, development, verification and validation of safety-related electronics or software demonstrates to NHTSA that an AV will perform reliably and safely under the conditions the vehicle is designed to encounter. Additionally, NHTSA must validate that the manufacturer's certifications of functional safety are accurate and reliable by conducting their own testing as needed.
- **Safe Fallback:** Every driving automation system must be able to detect a malfunction, a degraded state, or operation outside of ODD and safely transition to a condition which reduces the risk of a crash or physical injury. In the event of a failure, it is essential that the occupants of a driverless car have the ability to assume manual control to complete or command a safe transition to reach a safe location and safely exit the vehicle. This mechanism must be accessible to all occupants, including people with disabilities and vulnerable populations. Commercial vehicles, including those used for public transportation or freight, present distinct challenges, such as the need to identify qualifications necessary to operate, that will need to be addressed separately.
- **Crash Procedures Standard:** Requires manufacturers to have procedures in place, including proper shutdown protocols, for when an AV is involved in a crash to ensure the safety of all occupants of the AV, other road users and emergency responders.
- **Standard for Over-the-Air (OTA) Updates:** Requires consumers be given timely and appropriate information on the details of the OTA update and ensures any needed training or tutorials are provided. Limits the circumstances in which manufacturers can update a vehicle OTA and provides requirements for OTA updates that necessitate a recall or an additional demonstration of safety. OTA updates that enhance the safety of a vehicle should not be optional or require the consumer to incur any additional expense. During the update process cybersecurity must be maintained. In developing the OTA standard, NHTSA should develop rigorous testing around the most effective way to push out OTA updates to owners and operators of vehicles. Updates must be accessible for all users, including people with disabilities. In addition, information on OTA updates should be available in multiple languages, similar to compliance with Section 508 of the Rehabilitation Act of 1973 (Pub. L. 93-112), and via video with closed captioning as appropriate, as well as other means of communication to promote access. In a commercial setting, it will be especially critical for there to be clear protocols for how and when OTA updates are carried out.

*Safety and Performance Data:* With the increasing number of vehicles with different automated technologies being tested and some being sold to the public, standardized data elements, recording, and access to safety event data are necessary for the proper oversight and analysis of the performance of the driving automation systems. Vehicles on the road today are already producing enormous amounts of data, and the amount and type of data will only increase as driving automation evolves. There are many stakeholders who need that data for numerous and varied reasons, most importantly safety. The DOT must issue a FMVSS requiring all vehicles to be equipped with technology that captures all necessary data to understand and evaluate the safety performance of AVs on the road. Moreover, following best practices, data on disengagements and near-misses would help to identify flaws in the technology and may allow cities and states to proactively invest in infrastructure improvements or update the design of dangerous intersections and corridors to ensure safety for all street users. Real-time data on vehicle speeds, travel times, and volumes enables states, cities, and communities to manage congestion and speed, un-

cover patterns of excessive speeds, evaluate the success of street design projects, and ultimately improve productivity and quality of life. It could also facilitate emergency response by summoning and providing important information to emergency personnel, assist in the safe extraction of occupants, and provide a way for first responders to safely disable and secure the vehicle. Safety and performance data should be made available to relevant stakeholders such as state and local governments, Federal agencies, operators or dispatchers of the vehicle itself, independent research bodies, law enforcement, first responders, insurers, and the public, with appropriate privacy protections.

*Manufacturer Submissions to NHTSA:* Any submission to NHTSA by AV manufacturers or developers must be mandatory, publicly available and include thorough and adequate data and documentation. Additionally, NHTSA must be directed to review and evaluate all submissions to assess whether an approach to automated driving system (ADS) development and testing includes appropriate safeguards for operation on public roads. Moreover, submissions should be substantive and include, but not be limited to the following issues: ADS control capabilities; ODD; other limitations and constraints; methods and timing of driver engagement (if applicable); data definitions; recording; and, accessibility. Miles accumulated by simulation, as opposed to on-road testing, cannot substitute for on-road testing or serve as the sole basis for the data included in the submission. (See section below on Proper Oversight of Testing.) If NHTSA finds information indicating further operation of these vehicles on public streets poses a danger, the Agency must be able to intervene and enforce the law<sup>4</sup> effectively, which will require not just the greater use of its existing authority but also new, stronger enforcement authorities that should be enacted by Congress (See section below on Additional Resources and Enforcement Authorities for NHTSA). If the Agency determines that a submission is deficient, manufacturers must be required to submit any additional information requested. The legislation should clarify that the Agency has civil and criminal penalty authority for false, fictitious or fraudulent submissions under 18 United States Code (USC) 1001. This submission process cannot be a substitute for NHTSA promptly issuing minimum performance standards through a public rulemaking process.

*Proper Oversight of Testing:* AV testing is already underway in many states and localities. Fundamental and commonsense safeguards must be instituted for testing on public roads including the establishment of independent institutional review boards (IRBs) to certify the safety of the protocols and procedures for testing of AVs on public roads. The IRB requirements established by the Department of Health and Human Services (HHS) in 45 Code of Federal Regulations (CFR) 46 should serve as a basis for the requirements for IRBs overseeing AV road testing and be modified as needed for this particular use. Test vehicles should be prohibited from providing a service for compensation. In Section 24404 of the Fixing America's Surface Transportation Act (FAST) Act (Pub. L. 114–94), Congress excluded test vehicles from having to comply with Federal standards as long as those vehicles are not sold to the public.

NHTSA actions required:

- Develop empirical data reporting standards and metrics for such data;
- Mandate developer reporting of the metrics to the public to enable comparison of AV safety performance among developers;
- Require manufacturers to provide data on the safety and performance of test vehicles and systems and to report safety-critical events including crashes and incidents that occur during testing that result in death, injuries or property damage;
- Verify developer compliance with all applicable laws;
- Make safety-critical event information publicly available with the rebuttable presumption in favor of disclosure, unless it is deemed proprietary or confidential in accordance with Federal law;
- Determine which safety-critical events must result in the suspension of testing until a thorough review is completed and additional safeguards are implemented and verified by the Agency, as necessary; and,
- Prior to the introduction of the AV into commerce, review and analyze testing for oversight and research purposes, including but not limited to rulemaking.

*Additional Resources and Enforcement Authorities for NHTSA:* Ensuring NHTSA has adequate resources, funds, staff, and enforcement authority is essential for the Agency to successfully carry out its statutory mission and address the multiple chal-

<sup>4</sup>Motor Vehicle Safety Act, Pub. L. 89–563 (1966).

lenges presented by the testing and deployment of self-driving technologies. The Agency also should be given additional enforcement powers including imminent hazard authority, and enhanced authority to pursue criminal penalties and levy larger civil penalties to ensure industry accountability and thwart misconduct.<sup>5</sup>

*Guaranteeing Accessibility for All*

*Access for Individuals with Disabilities and Older Adults:* Nearly one in five people in the U.S. has a disability (more than 57 million), and 16 percent of the U.S. population is over the age of 65. Yet, significant barriers to accessible, affordable and reliable transportation remain across all modes, and many people with disabilities are unable to obtain a driver's license and cannot afford to purchase an accessible vehicle. Autonomous driving technology has the potential to increase access and mobility for older adults and individuals with disabilities, including those with sensory, cognitive, and physical disabilities, wheelchair users, and people with neurological conditions, who have varying needs as well as traditionally underserved communities. This goal can be realized by Congressional directive ensuring access for everyone, including accessible HMI, and ramps and securement for wheelchair users. Discrimination on the basis of disability in licensing for SAE International level 4 and 5 AVs must also be prohibited. In addition, the diverse needs of all members of the disability community and older adults must be accommodated for systems that require human engagement as well as when developing a safe fallback.

*Access for Underbanked Populations:* Access to on-demand transport services is often predicated on the ability to make digital payments. Twenty-five percent of U.S. households are unbanked or underbanked, with higher incidence in working-age disabled households, lower-income households, less-educated households, younger households, Black and Hispanic households, and households with volatile income. AV-based transport services must consider a variety of ways in which payment for service can be made in order to ensure that this technology supports equitable access and the inclusion of all.

*Equity:* Transportation is an imperative part of life. It is the connector for people's work, medical care, worship, recreation, essentials for life and all other tasks. As new modes of transportation continue to grow and evolve, investment and development must include a process where all people can safely participate.

*Accessibility, Passenger Safety, and Transportation Services:* The safety of passengers is not a monolith, and the measurement and descriptions of safety differ for all people in particular for those who are part of marginalized communities. The use of public transportation safely is currently partially in control of the operators of the modes and vehicles. Human interaction remains essential even when there is an AV and no operators. There must be clear plans that coordinate the safe transportation for all people including the need for delivery of medical care as well as laws that embrace social equity to protect those who are marginalized (Black and Brown people, Indigenous people, lesbian, gay, bisexual, transgender, queer, + (LGBTQ+) people, people with disabilities, women, older adults, and all other groups) in the implementation of these transportation services.

*Preserving Consumer and Worker Rights*

*Consumer Information:* Consumer information regarding AVs should be available at the point of sale, in the owner's manual, including publicly accessible electronic owner's manuals, and in any OTA updates. The vehicle identification number (VIN) should be updated to reflect whether certain features were built into the vehicle, either as standard or optional equipment. Additionally, similar to the user-friendly safecar.gov website, NHTSA must establish a website accessible by VIN with basic safety information about the AV level, safety exemptions, and limitations and capabilities of the AV driving system including those resulting from OTA updates. The U.S. New Car Assessment Program (NCAP) was the first government program to provide the public with comprehensive auto safety ratings, including crash test results. It is vital that Congress require NHTSA to act upon consumer and stakeholder recommendations to modernize U.S. NCAP (*See Claybrook/Advocates for Highway and Auto Safety paper*) and include ratings on how vehicles perform in crashes with motorcyclists, pedestrians and bicyclists. This enhancement of NCAP will be especially crucial as AVs are introduced into the marketplace. Consumer information should be available in multiple languages, similar to compliance with Section 508 of the Rehabilitation Act of 1973 (Pub. L. 93-112), and via video with

<sup>5</sup> If NHTSA is not to have authority over the commercial operation of an AV, these same oversight powers must be conveyed to the respective modal agency responsible for overseeing the deployment of commercial AVs.

closed captioning as appropriate, as well as other means of communication to promote access.

*Privacy:* Passenger vehicles have the potential to collect significant amounts of data that could interfere with personal privacy rights. Therefore, all manufacturers of passenger motor vehicles, including AVs, should be required to comply with robust data privacy safeguards and policies. Any personally identifiable information (PII) should only be collected or shared for purposes of delivering the services a consumer has requested or affirmatively opted-in to, with appropriately tailored exceptions for essential public purposes, safety, data security, compliance with regulatory requirements, and analytics/performance monitoring, among other purposes. Companies should be required to be transparent with consumers and workers operating a vehicle about the collection and sharing of information, protect information associated with the vehicle and the vehicle itself from data breaches, obtain consumers' express permission to sell or disclose their PII to third parties, and provide consumers the ability to access and delete PII that is not needed to support essential public purposes, safety, data security, compliance with regulatory requirements, and analytics/performance monitoring. The ability of NHTSA, the NTSB, and local law enforcement to access critical safety performance data, while preserving the integrity of personal, private or identifying data, in a timely manner for research, crash investigation and other governmental purposes must be preserved. In addition, radio spectrum needed for traffic safety purposes including vehicle-to-everything communications must be limited to non-commercial use.

*Workforce Protections:* The deployment of AV technology will have a significant impact on our Nation's workforce. While these technologies will create new business and employment opportunities, they will also lead to displacement and major shifts in jobs and job functions that will not necessarily be linked to those new opportunities, especially for those same individuals who are being displaced. Policymakers have a major role to play in determining whether AV deployment will help or harm working people and whether the benefits from these technologies will be broadly shared. Absent strong leadership, AV technology risks worsening severe inequalities already inherent in our society, predominantly for blue collar workers. Existing and foreseeable issues which stand to be greatly exacerbated by this technology must be addressed before this technology is broadly deployed on our roads. Similarly, unforeseeable issues throughout deployment will need to be resolved with input from affected stakeholders. Congress must ensure that workers and unions are partners in the development and implementation of AV technology and policy. It must recognize the projected negative effects of a transition to AVs, including but not limited to ensuring strong worker protections in Federal funding and procurements, and providing worker support programs for current and future workers including training and re-skilling to ensure that displaced and otherwise affected workers are able to move into middle class jobs created by technological change. In order to achieve these goals, Congress must also take action to require companies and government agencies that plan to transition to AV fleets to be transparent and honest with their workers regarding budgets, plans—including training programs—and timelines for the implementation of new technology. In workplaces where the employees are unionized and thus bargain collectively, these issues should be negotiated.

*Whistleblower Protections:* Employees or contractors of any manufacturer, supplier, or operator of software or hardware for AVs who want to report safety defects to NHTSA should not be prevented from doing so as the result of a non-disclosure agreement (NDA). The type of protections afforded whistleblowers in Section 31307 of the Moving Ahead for Progress in the 21st Century (MAP-21) Act (Pub. L. 112-141) as well as Section 24352 in the FAST Act (Pub. L. 114-94) must be extended in any AV bill. In addition, the Department of Labor prohibits a NDA that prevents an individual from providing information to the Federal government. However, only a limited number of cases have been filed with the Occupational Safety and Health Administration. Therefore, more must be done to inform employees as to their rights and responsibilities when such a situation arises.

*Consumer and Worker Rights<sup>6</sup>:* The well-established rights of consumers to seek accountability in a court of law for injuries suffered as a result of AVs must be preserved. Nothing in this bill shall exempt a person from liability at common law or under a state law, or permit a consumer to be required to forgo their rights by a manufacturer or provider of AVs. Moreover, exploitative independent contractor relationships that shield AV companies from liability and deny workers basic workplace rights should be explicitly prevented.

<sup>6</sup>Advocates for Highway and Auto Safety does not take a position on this issue.

*Ensuring Local Control and Sustainable Transportation*

*Local, State and Federal Regulatory Roles:* The statutory mission of the DOT established by Congress in 1966 is to regulate the performance of motor vehicles to ensure public safety, which now includes AVs. In keeping with existing law and practice, the Federal government should prescribe regulations for the performance of these vehicles, leaving regulation of the operation of these vehicles to the states. Even after Federal regulations are in place regarding AVs, existing federalism practices demand that states retain a legal right and a duty to their residents to develop proposals and implement solutions to ensure public safety. In addition, state and local governments have the authority to manage the operation of vehicles on their streets to address concerns such as safety, noise, local air quality, and congestion. Any action on the regulation of AVs shall not preempt states and localities from regulating the operation of these vehicles just as they do for traditional motor vehicles.

*In-Depth Study of AV Impacts on Transportation Systems and Environment:* AVs could have direct and indirect negative impacts on safety, congestion, pollution, land use, accessibility, transportation infrastructure capacity and needs, energy consumption, public transit, jobs and job functions, mobility and equity. DOT must be directed to undertake a comprehensive study to inform policymakers and the public about how these vehicles will impact our existing transportation systems and ensure effective mitigation of problems identified. Implementation of infrastructure to support the safe operations of AVs, such as placement of electric vehicle charging stations, visible lane striping, and uniform and unobstructed signage, must be equitable for all communities to ensure equal opportunity for people of all racial and socioeconomic backgrounds.

*NOTE:* The AV Tenets outlined in this document do not constitute the entirety of each supporting organization's policy priorities related to AVs.

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 GLOSSARY OF ACRONYMS

*ADS*—Automated Driving System  
*AV*—Autonomous Vehicle  
*CFR*—Code of Federal Regulations  
*DOT*—Department of Transportation  
*FAA*—Federal Aviation Administration  
*FAST*—Fixing America's Surface Transportation Act, Pub. L. 114–94  
*FMVSS*—Federal Motor Vehicle Safety Standard  
*GAO*—Government Accountability Office  
*GVWR*—Gross Vehicle Weight Rating  
*HHS*—Health and Human Services  
*HMI*—Human-Machine Interface  
*IRB*—Institutional Review Board  
*LGBTQ+*—Lesbian, Gay, Bisexual, Transgender, Queer, +  
*MAP-21*—Moving Ahead for Progress in the 21st Century Act, Pub. L. 112–141  
*NCAP*—New Car Assessment Program  
*NDA*—Non-Disclosure Agreement  
*NHTSA*—National Highway Traffic Safety Administration  
*NIST*—National Institute of Standards and Technology  
*NTSB*—National Transportation Safety Board  
*ODD*—Operational Design Domain  
*OTA*—Over-the-Air  
*PII*—Personally Identifiable Information  
*SAE*—Society of Automotive Engineers  
*USC*—United States Code  
*VIN*—Vehicle Identification Number

Senator PETERS. Thank you, Senator, for your questions.  
 The Chair recognizes Senator Thune for your questions.

**STATEMENT OF HON. JOHN THUNE,  
U.S. SENATOR FROM SOUTH DAKOTA**

Senator THUNE. Thank you, Mr. Chairman, for holding this important hearing.

In the late 1890s, the newly invented automobile was met with more than a little skepticism, even fear, by contemporaries, as new technologies often are, and at that time, the so-called horseless carriage was initially an object of ridicule and early inventors struggled to find businessmen who were willing to invest, but by the year 1911, thanks to the ingenuity of Americans like Henry Ford, nearly 150,000 automobiles were being produced in the United States each year and that number swelled to 1.5 million by the year 1920.

The United States not only led the world in automotive innovation but in automotive democratization, as well, and today, the United States auto industry, which still produces more than 11 million vehicles annually, is on the cusp of another transformation.

Automated vehicles or AVs will once again radically alter the way Americans move and this will be especially true for the elderly and persons with disabilities whose current transportation options are limited, especially in rural areas.

Moreover, it has the potential to greatly reduce the average of more than 40,000 traffic fatalities on our Nation's roadways each year, and while the U.S. companies are currently leading the world in AV technology, this advantage cannot be taken for granted.

China is already acting boldly to take the lead in developing this technology and if they do, China, not the United States, would play a lead role in the development of standardization of AV technology.

Allowing China to seize the mantle of innovation is unacceptable and the U.S. must also act boldly to maintain its position.

The United States regulatory framework has got to catch up with the private sector innovation in order for these technologies to advance and literally tens of thousands of good paying jobs and billions of dollars of investment are at stake, which is why the Chairman, Senator Peters and I have worked together for the better part of 5 years to develop and enact AV legislation that is part of a broader legislative framework to bolster American competitiveness.

I look forward to continuing to work with Senator Peters in a bipartisan manner on this critically important legislative framework.

AVs have potential to once again transform the way Americans move and the U.S. must once again lead the world in this transportation revolution.

Mr. Bozzella, in your testimony, you highlighted a policy roadmap that reduces uncertainty in the development of AVs. Could you describe why expanding the number of exemptions which are granted by NHTSA only when an equivalent level of safety is attained is so important to the testing and deployment of AVs?

Mr. BOZZELLA. Yes, thank you, Senator. I appreciate the question.

It really is important. We have to create a new regulatory framework for highly automated vehicles, these SAE Levels 3 through 5. In order to do that, we need more data and to get that data, we need to have an interim regulatory process, so-called exemption process, that needs to be robust and needs to be expanded.

The small current process doesn't give us enough vehicles on the road or enough data over a long enough period of time to really get that insight and data and so the more data, the faster we can get life-saving highly automated vehicles on to roads.

I think the other point I would make is this is a regulatory process that ensures safety. These vehicles have to be as safe as or safer than the vehicles that they would replace and so absolutely the exemption process is essential to our continued leadership in this space.

Senator THUNE. All right. Ms. Wilson, I don't know if you can hear me. My screen froze up. Can you describe how expanded exemptions for AVs would benefit your industry and the millions of people that are employed by your members?

Ms. WILSON. Absolutely. Thank you, Senator, for your leadership on this issue and yours and Senator Peters. It's made a great deal to us.

I think one of the important things here that we've talked about is our members are responsible for creating and working with vehicle manufacturers to create these new technologies.

To be successful as a supplier, you have to be able to provide technology to a wide range of vehicle manufacturers. So one of the things that I think is so important about this is to allow suppliers to test on public roads, current suppliers who have customers who are currently validated to manufacture vehicles, so that you do again, just as Mr. Bozzella was saying, provide more data into the system, and the more that we know, we know what won't work and what will work.

I think one of the things that's really concerning when you mentioned competitiveness, years ago an engineer for one of our companies said, look, you need to understand this isn't like making brake products or lighting products where we can do it to a variety of standards. Because of infrastructure needs, because of cybersecurity, we will make these only to one standard.

So if we allow China or another country to move ahead of us, then we will not be able to catch up because this industry just will not be able to do it. So having those abilities to do more testing is critical.

Senator THUNE. Thank you, and, Mr. Chairman, my time has expired. Thank you.

Senator PETERS. Thank you, Senator Thune, for your questions, and thank you for your partnership as we continue to work on legislation to bring this safety legislation forward and this technology forward. As we talked about earlier, it's unacceptable that 40,000 people die on our highways. Every day that we delay, more people die. We can do better than this status quo. Hopefully we'll be able to move this forward.

Senator Luján, you are now recognized for your questions.

**STATEMENT OF HON. BEN RAY LUJÁN,  
U.S. SENATOR FROM NEW MEXICO**

Senator LUJÁN. Thank you, Chairman Peters, and I'll pick up where you left off.

I want to make sure that we're helping to stop needless deaths on the road as part of this, and I want to thank you, Mr. Chair-



man, because you told me today and your team told me that you're going to be co-sponsoring the RIDE Act, and I have the unanimous consent with me right here. I'm going to drop it off after this hearing to add you as a co-sponsor of it. So just want to say thank you, sir, from the bottom of my heart and from so many families across America who are still telling their stories of loved ones that they've lost or how they've been victims of drunk driving accidents, as well.

I also want to recognize Ranking Member Fischer and say thank you for this important hearing.

Now the bill that I introduced with Senator Rick Scott would require rulemaking for automakers to include drunk or impaired driving prevention technology in all new vehicles. The technology would detect when a driver is impaired and prevent the car from operating.

Mr. Bozzella, have you ever been hit by a drunk driver?

Mr. BOZZELLA. No, I have not.

Senator LUJÁN. I have. I got hit head on by a drunk driver 29 years ago and there were many nights that I'd be driving home after that accident or driving anywhere and all I would see were headlights coming at me and it scared me to death. Couldn't sleep many nights because as soon as my eyes closed and there was darkness, two headlights would light it up.

Do you drive a car?

Mr. BOZZELLA. Yes, I do.

Senator LUJÁN. So you may have this shared experience with me sometimes where you've been in a vehicle and you see a car driving a little erratically. You see the vehicle go across the middle lane and maybe they go back over and they hit the rumble strip and then they accelerate and then they brake and then maybe you've seen it, I know I have, where they go into the oncoming lane. You're nodding yes, you've seen that?

Mr. BOZZELLA. Yes, I have.

Senator LUJÁN. Mr. Bozzella, today, just today, the Alliance for Automotive Innovation announced, I quote, "Driver Monitoring Principles." These standards clearly show that you believe the technology is there, that every new car should include driver monitoring as a standard feature, the capability to issue driver warnings and the ability to re-engage the driver, is that correct?

Mr. BOZZELLA. That is correct.

Senator LUJÁN. And just this week, your member companies were calling on this committee to pass an amendment that gave an exemption to autonomous vehicles, self-driving cars, is that correct?

Mr. BOZZELLA. Yes.

Senator LUJÁN. Now my question to you, Mr. Bozzella, if your members believe AVs are good enough drivers to be exempt from liability in some cases, how many warnings should a car make before taking the wheel on pulling over, on calling the Ride Share for help? How many driver warnings should a car give before it knows that something is wrong and the car should pull over?

Mr. BOZZELLA. Yes. So, Senator, thank you for your question.

First of all, I can't imagine what it must have been like to have that experience and I said the same to Ms. Abbas Taylor, and my deepest sympathies to you and especially to Ms. Abbas Taylor for what she went through.

That is why we're working as hard as we can to do a number of things. First, we're working on passive alcohol detection technologies. We should detect blood alcohol content in people before the vehicle ever even gets underway and we're working to commercialize that technology.

In addition, we're working on, as you point out, opportunities for driver behavior monitoring and driver state monitoring to be able to add to that overall situational awareness. All of these technologies have an opportunity to address this, and we want to work with you, with NHTSA, and with MADD to get this done.

Senator LUJÁN. Mr. Bozzella, are you prepared today through the Alliance for Automotive Innovation to support the RIDE Act?

Mr. BOZZELLA. We are looking forward to working with you, with NHTSA, with MADD to help address and ultimately help eliminate drunk driving in this country.

Senator LUJÁN. So you're not a yes yet today?

Mr. BOZZELLA. We want to work with you on—

Senator LUJÁN. OK. I heard you. Look. I'm out of time now to ask important questions to Rana who has an incredible story to tell about the loved ones that she's lost. All of the other witnesses here, Mr. Chairman.

The simple answer is yes. We're asking for exemptions to have cars drive themselves. That means that somebody thinks it's OK that those technologies are watching what the driver is doing because they don't have to do a thing. This is easy. This technology exists today.

So, Mr. Chairman, I hope we can sit down soon. I hope we get to an answer to yes. There's no reason that the United States of America can't lead, that we can't save more lives. If that's what I'm hearing out there, that's what shareholders are being told, then let's tell those families that were victims, those of us that were in cars that were hit head on by drunk drivers that we can stop this and we can get to yes on the RIDE Act.

Thank you, Mr. Chairman. I yield back.

Senator PETERS. Thank you, Senator Luján, for those questions, and thank you for your passion, as well, on this issue.

As we continue to develop these technologies, it's important that it's tested very thoroughly before it gets out on the roads, and, Mr. Sarkar, I know that is something that you're intimately involved in at the American Center for Mobility, is making sure that these vehicles are run through their paces, data is collected before they get out on the roads, and then you continue to collect that data clearly once they're out on the roads.

My question to you, sir, is could you tell us about the type of testing work that you're conducting, specifically how it relates to leveraging autonomous vehicles or other transportation innovations, and what are some opportunities for us that you see?

Mr. SARKAR. Yes, Senator Peters. Thank you for the question.

So ACM is a shared use smart mobility test center which means that it's a type of advanced proving ground which goes beyond the traditional automotive proving ground in that it brings forward tracks tied in with advanced infrastructure for communicating to vehicles along with a lot of equipment that's necessary to test both connected and autonomous vehicles.

Auto companies and Tier 1 AV developers all the way down into small startups can rent use of the facility, come and run tests to verify the technical performance of those systems.

In parallel with offering the facility to do validation, we're in the process of developing and supporting the development of industry standards which I mentioned earlier is the measuring stick by which you determine how a technology is performing.

So we work also with automotive partners through the American Center for Mobility to help accelerate the development of industry standards which will ultimately lead into tests for Federal standards and a catalog of tests that companies can come and test against to determine how well they're comparing to the measuring stick.

I think one of the key things that we wanted to emphasize for deployment of these technologies in consumer comfort as well as comfort of the legislature is validation, right, and that's the focus of what we do at ACM, and so we provide a facility that individually would be too expensive for any individual company to purchase, but as a shared investment makes it more accessible to a wider variety of companies and lowers the hurdle for developing and validating these types of safety technologies.

And then related to the question regarding what happens inside the vehicle and the consumer interactions with the vehicle, we do see a large opportunity to increase testing, validation, and research in the area of human factors and consumer behavior, so that you're not just testing these cars with an engineer in the seat and seeing how the technologies perform but you're testing it with the consumer in the seat and seeing how they're actually going to use these technologies in practice.

Senator PETERS. Thank you.

Next, I'd like to turn a little bit to workforce development which I know, Ms. Wilson, you brought up and, Mr. Sarkar, in your testimony, you also bring up the topic, and you reference a report from the University of Michigan that explained that connected and autonomous vehicles will have enormous job growth potential as they move from research and testing to full-scale production in the years ahead.

First off, I'd like you to elaborate on that in terms of the job potential as a result of this technology and then how we need to make sure that workers have the right skills and training to be able to take advantage of those opportunities and after your response, Ms. Wilson, if you'd want to add further perspectives of your members, as well, would be helpful. Mr. Sarkar?

Mr. SARKAR. Yes, thank you.

As I mentioned in my testimony, whenever you have a wave of technology innovation, there's usually a great spike in demand for the most highly qualified resources, Ph.D.s and graduate degrees, followed by a gap in the supply of qualified resources to help companies effectively compete and staff their ranks.

That gap usually happens in the area of middle skills and the middle skills job, just to be defined here, is a job that can be acquired with less than a 4-year degree, perhaps with some college education, greater than a high school education.

However, as these technologies evolve and we get hit with more and more waves of innovation, there's an increasing gap in that middle skills arena that could be filled with proper training and up-skilling to teach technicians some of the more advanced skill sets, such as software development.

As you know, today's cars are no longer just mechanical systems that, you know, the hobbyist mechanic can work on. They require advanced skills to understand how software and computers in vehicles work, cyber-related issues. These are increasingly becoming cyber-physical systems. They're connected and therefore they have to be protected.

And then in the area of systems level thinking, there's really an opportunity to take technicians and train them to be almost front-line engineers and what we hear from auto companies is they would like technicians who are more capable of doing that frontline engineering work, that systems level thinking and that problem-solving, that then helps them develop the products.

So again I think there's a great opportunity to up-skill the middle skills area and then we also need to define that feeder of K through 12 all the way into getting more people coming out of college or through apprenticeships with the right skills to work on not only the vehicles but the infrastructure that's going to be deployed throughout our transportation system network.

Senator PETERS. Thank you.

Ms. Wilson?

Ms. WILSON. Yes, Senator. If you got a group of our CEOs in a room, they would tell you the two most critical issues they have right now to continue to operate in the United States are workforce and the supply chain, and these longer-range issues are of concern to them, but these are the things that they're dealing with on the day-to-day basis.

So when we look at workforce, indeed, it's true. It's the technical skills area, whether we have sufficient number of those people, whether we can bring those people in to operate in the facilities and they can see a future in those. So this is a daily problem right now.

I think what's really the real crux of the issues going to happen is that as we move toward electrification and if we move too quickly to a fully electrified fleet, we could lose 30 percent of the supplier jobs in this country and as we are, we have about 907 direct jobs. That is a significant number of jobs and many of my members think it's going to be even more than that.

So what we have to do is take this opportunity in this infrastructure legislation and say what works and what doesn't work? What can the Federal Government do to provide technical schools in states with money for up-skilling programs, for apprenticeship programs, working with the private sector so we have public-private partnerships on this? What skills will no longer be necessary? What skills can people then maybe translate to in a more automated world?

Then we have to do retooling, too, because, as you know very well, retooling of a facility is no small feat, and we need to give those who might not have an ability to make a manufacture compo-

ment or a system in a fully electrified vehicle a chance to retool their facility and retrain the workers.

We know it can be done. I've heard many success stories in Michigan and I know as you have, too, where people have done the same thing to, you know, make other safety components or other more fuel efficient components. It can be done, but it's going to take a degree of effort and concentration that I don't think we've really witnessed before.

The Federal Government is going to have to act in this because the state governments just don't have the resources to do it.

I think the other thing that's really important, and I know you know this, too, our members are all over the country. So to sort of say we can isolate this issue to Michigan, Ohio, you know, South Carolina, we can't. We are oftentimes the largest employer in many counties, you know, employing 500, 750 people in a county, and those jobs are dependent on those suppliers and those supplier jobs are dependent on the well-being of that area. So there's a lot riding on the ability to be able to do this.

Senator PETERS. Well, thank you for that answer.

Senator Lummis, you are recognized for your questions.

**STATEMENT OF HON. CYNTHIA LUMMIS,  
U.S. SENATOR FROM WYOMING**

Senator LUMMIS. Thank you, Mr. Chairman, and thanks for conferring so I could be in another hearing and now pop over to be with you. I really appreciate it.

I want our witnesses today to know that, you know, sometimes Senators try to tease a narrative out of witnesses and sometimes they just genuinely don't know the answers to the questions they're asking, and I want you to know that for me, it's the latter. I genuinely don't know the answers to these questions. So I hope that you'll give me some guidance here as to your opinions.

OK. Mr. Sarkar, as autonomous vehicles are deployed throughout the country, are there certain technologies that will rely on connectivity via the 5.9 safety band or will all the necessary safety technologies be contained in the autonomous vehicles?

Mr. SARKAR. Yes, Senator Lummis, thank you for the question.

So I think it's important to point out that there are connected vehicles and that there are automated vehicles and then you can have connected and automated vehicles. So they can be two separate things.

It is possible to have an automated or autonomous vehicle operate without connectivity solely based on sensors in the maps that it uses to drive the car. However, many people will tell you that to have the full benefits of cooperative driving, you have to have some degree of connectivity in the car which allows the vehicles to talk to vehicles and the vehicles to communicate to the infrastructure. So the end game ultimately is connectivity plus automation.

Now the timing for connectivity, some people will say, will take longer than the availability of automation right now. So the two will likely move forward together.

With regards to the spectrum, obviously the change in direction from the dedicated short-range communications or DSRC has some

reinvestment required to then leverage cellular V2X or CV2X technologies through the 5.9 gigahertz spectrum.

However, those technologies should become available and do not require substantial upgrades to get there. So some portion of the connectivity will come through the 5.9 gigahertz spectrum and then, on top of that, the next layer of connectivity will come through the 5G stellar communications or 5G broadband, which is outside of the 5.9 gigahertz spectrum. So you have connectivity coming in two locations.

Senator LUMMIS. Thank you.

Ms. Wilson, what are the practical implications of the FCC's November Order on the safety band? Does your industry have concerns that certain technologies will not be able to operate on these 30 megahertz that were reserved for transportation technologies?

Ms. WILSON. Absolutely, Senator. I think it's a great question.

I mean, one of the things that we've got to think about here is, you know, they've shortened the band and one of our members' concern is can we really share the spectrum that's out there, and I have seen no evidence and have had no evidence presented to me by our members that actually seems opposite, that the band cannot be shared and also to be able to make sure that vehicles are safe at the same time. So there's that particular concern.

The other piece is that there's an opportunity here that we've missed. So that, you know, the CRM signal which is relatively easy and relatively inexpensive to actually turn on so that when we move that with automated technology so you can say, oh, there's a car coming around the corner, my AEB needs to be taken into place.

So those two together can dramatically improve safety in a relatively inexpensive way to do this. So this has been a real opportunity lost and we hope that there could be efforts made to have the Commission reconsider it.

Senator LUMMIS. OK. Thank you.

Mr. Bozzella, if the full 75 megahertz of the safety band were preserved for transportation safety technologies, how quickly would the auto industry be able to deploy these technologies?

Mr. BOZZELLA. Thank you, Senator Lummis.

These technologies are ready for deployment right now, especially dedicated short-range communications, and also CV2X right along with it, and so if there are 75 megahertz, what you would see is deployment of both technologies with a band-sharing plan that the industry has already worked out and a commitment to deploy over five million of these V2X radios right now.

So we would have the opportunity to move forward right away. Unfortunately, the FCC Order reduces the band width to 30 megahertz and doesn't respond to the interference questions that have been raised.

Senator LUMMIS. Well, thank you all. I have additional questions, and I might just follow up with you personally since I'm trying to educate myself about this subject.

Hey, thank you all for testifying and thank you again, Mr. Chairman, for allowing me to participate.

Senator PETERS. Senator Lummis, thank you for your questions.

The Chair now recognizes Ranking Member Fischer for your questions.

Senator FISCHER. Well, thank you, Mr. Chairman.

I just have one more question for Mr. Sarkar. In your testimony, you talked about virtual testing as a key component to compress the development cycle of AVs. Basically, virtual testing could advance the deployment of those vehicles.

What are some of the limitations of virtual testing, and what should Federal agencies consider when reviewing data and analysis from virtual testing?

Mr. SARKAR. Yes, thank you for the question, Senator Fischer.

So virtual testing obviously has the advantage that you can run millions of miles and many thousands and tens of thousands of scenarios very quickly to determine kind of zones of where things are working well or not.

However, virtual testing is obviously a representation of the real world. It doesn't reflect exactly the real world. So there's always some physical testing that's required.

One area of limitation in virtual testing is access to edge cases or the data. You heard this mentioned earlier that you need more data to define the edge cases around which you need to test and train artificial intelligence for vehicles.

So access to more data and more real world what they call naturalistic data is one limitation, and then a second limitation is that you can't test all of the physical environments within a virtual test and things such as interoperability may also require physical testing at a track, and so virtual testing gives you a tool that allows you to do rapid amounts of simulation quickly to kind of hone in on a zone for testing but we believe strongly that you then need to go and put that into a controlled track or test environment.

The tools continue to get better. They continue to get more data fed back into enhanced capabilities and that's one of the key things that we want to emphasize is that there are more advanced tools available, things like augmented reality, which actually merged simulation with physical testing, so you can get kind of the best of an actual vehicle on a road combined in with the simulation tool, but those areas need more funding, more research to advance them forward.

So I think the key thing is data on the front end to know what you're simulating and it has to be based on naturalistic real world data that you can only get from public driving.

Senator FISCHER. Thank you very much. Thank you, Mr. Chairman.

Senator PETERS. Well, thank you, Ranking Member Fischer.

Before we wrap up this hearing, I have one more topic that I think it's important for us to raise and that's related to supply chains and what can happen when supply chains are not operating the way we would like them to operate, which is certainly happening in the auto industry.

It's not something new. In fact, back in 2019, when I was Ranking Member at that time, not Chair but Ranking Member of Homeland Security and Government Affairs, we put out a report on supply chains for medical supplies for the precursors of drugs, high drug prices, and it was pretty clear in that report that we were

overly reliant on critical parts of our supply chain from foreign countries in terms of the precursors of the drugs that nearly all of our drugs are based on, primarily China, not to mention medical supplies that are critical for us here in this country.

And that report, when I put it out, my conclusion was when there is a pandemic, this United States will find itself in a precarious situation. A few months after that report came out, it ceased to be an academic report and became real life as we saw that our supply chains are very efficient but they're not resilient, and when things go bad, bad things can compound dramatically.

We're now seeing that when it comes to semiconductors and the impact that it's having with the auto industry.

Ms. Bozzella, I want to start with you and I'll ask Ms. Wilson to add the impact with your companies, as well.

Mr. Bozzella, tell us a little bit about what's happening right now with this supply chain for semi-conductors. How did we get here? What do we need to move forward so that we fix this situation?

Right now in Michigan, I've got workers who are being laid off. That's all over the country, not just in Michigan. We're seeing employment disruptions and, of course, that spills over not just into the auto industry but other industries, as well.

So tell us what happened. What do we need to do to fix it?

Mr. BOZZELLA. Yes. Mr. Chairman, you know, it is really important that we do have resilient supply chains. What we've seen with microchips, auto-grade micro-processors is in fact this issue that you've described.

As a result largely of the pandemic and the supply and demand imbalance with the auto industry shutting down completely in North America for 8 weeks in the midst of the pandemic, this resulting supply and demand imbalance.

What's happening is as a result we are idling automotive production right now in this country because of a lack of auto-grade chips. So it is important that as we look forward we do have control, better control of supply chains for critical elements, like micro-processors, and also, I would add, things like rare earth minerals and components for electric vehicles, which are going to be also important, and where China has an advantage right now with those supply chains.

Senator PETERS. Ms. Wilson, I know the companies that you represent are definitely being hit. Why don't you tell us about it?

Ms. WILSON. Yes. I think there are a lot of things that went into how it happened. I think there is exactly the industry shutdown. There was not an understanding among anybody about how quickly it would ramp up and that ramp-up required more of those semi-conductors and more of those motor vehicle-grade wafers.

You know, I have learned more about semiconductors in the last 4 months than I ever thought I would need to, but the motor vehicle-grade wafers are different than those that are in our iPhones or some of our other technologies. So there's also the concern about the lag times that are necessary to actually manufacture them.

I would say the other things that go on also have to do with imbalance of trade because we do have an imbalance of trade and that's really being seen at our Nation's ports right now.



I know, Senator Fischer, you've got some concerns of your own about that and that is actually sort of feeding into this whole crisis.

There's no doubt about it, what John is saying. You know, when a vehicle manufacturer goes down, our suppliers go down, too, and we have to do a couple of things. We have to look long term, like the CHIPS Act is trying to do, and try to address both the chips overall but also what's going to happen with motor vehicle-grade wafers, but we also need to work with those countries where we have semi-conductor production going on right now, so that we can make sure that we can heal this because what I'm hearing is this could well go into the fourth quarter of this year, if maybe not into next year, and that is extraordinarily concerning when you start to think about getting the economy back up and running.

This is not just an auto issue. It is also happening in our commercial vehicle sector. It just happens to be that the autos are most affected.

Since you gave me the opportunity to talk about supply chains, I would tell you this is only one piece of this, and I think the President should be congratulated for really bringing this to everybody's attention. We have participated in the conversations on electric batteries. We will submit comments tomorrow on rare earths and critical minerals.

We're seeing the same thing going on right now in resins, on foam, on steel. I mean, it's compounding itself over and over again, and on the Nation's ports, one of our larger members, this is a global supplier, they spent \$11 million more on logistics in the first quarter of this year because of the cost of logistics and what's happening at the ports. That is money that cannot be translated into retraining workers, into dealing with electrification or automation or all these longer-term issues that we're dealing with.

So we really have to double down and figure out how we do this. Otherwise, all the opportunities we're talking about today, we could lose very quickly.

Senator PETERS. Well, thank you for that, and please know that this subcommittee and this committee will continue to aggressively deal with all of the issues that you have raised.

I'd just like to say as this hearing concludes that I would like to reiterate my appreciation for all of our witnesses, for your very forthright testimony today.

I especially want to thank Rana Abbas Taylor for bravely sharing her family story.

You know, the auto industry has been a bedrock for the American economy and the middle class for the last hundred years and I look forward to working with all of you to deal with the issues that have been raised today from safety to economic competitiveness and the future of our workforce in this country.

So with that, the hearing record will remain open for two weeks. Any Senators that would like to submit questions for the record should do so within two weeks.

Senator PETERS. And with that, this hearing is now adjourned.  
[Whereupon, at 4:13 p.m., the hearing was adjourned.]



## A P P E N D I X

INTELLIGENT TRANSPORTATION SOCIETY OF AMERICA  
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS  
April 27, 2021

Hon. GARY PETERS,  
Chairman,  
Subcommittee on Surface Transportation, Maritime, Freight, and Ports,  
Committee on Commerce, Science, and Transportation,  
United States Senate,  
Washington, DC.

Hon. DEB FISCHER,  
Ranking Member,  
Subcommittee on Surface Transportation, Maritime, Freight, and Ports,  
Committee on Commerce, Science, and Transportation,  
United States Senate,  
Washington, DC.

Dear Chairman Peters and Ranking Member Fischer:

In anticipation of the Committee on Commerce, Science, and Transportation Subcommittee on Surface Transportation, Maritime, Freight, and Ports hearing entitled “*Driving Innovation: the Future of Automotive Mobility, Safety, and Technology*,” the Intelligent Transportation Society of America (ITS America) and the American Association of State Highway and Transportation Officials (AASHTO) jointly write to you to highlight the importance of the 5.9 GHz Safety Spectrum to transportation safety and express our significant concern with efforts underway at the Federal Communications Commission (FCC) to reallocate spectrum in the 5.9 GHz band.

Reducing the amount of spectrum available to Vehicle-to-Everything (V2X) technology undermines our shared interest in reducing the number of traffic injuries and fatalities that occur each year on U.S. roadways, improving motor vehicle safety and transportation equity, and improving the operational performance of roadways as well as reducing greenhouse gas emissions by reducing congestion across the transportation system.

*We ask you to use the Committee on Commerce, Science, and Transportation’s authority over the FCC to:*

1. *Direct the Commission to reconsider its proposal to give away 45 MHz of the 75 MHz in the 5.9 GHz band for use by unlicensed devices, such as Wi-Fi, cutting the spectrum available for V2X safety technologies by more than half;*
2. *Direct the Department of Transportation, Department of Commerce, and FCC to determine whether the band can be shared with unlicensed users in the lower part of the band without causing harmful interference to V2X in the upper 30 MHz before reallocation of the 45 MHz of spectrum to unlicensed devices; and*
3. *Direct the Department of Transportation, the Department of Commerce, and the FCC to analyze spectrum requirements necessary to enable innovation in intelligent transportation systems, including autonomous vehicles and applications to protect vulnerable road users.*

As you know, the 5.9 GHz spectrum band is currently reserved for intelligent transportation systems. Commonly referred to as V2X technologies, these systems allow vehicles to communicate with other vehicles, bicycle and pedestrian road users, infrastructure, and law enforcement to avoid crashes, enhance safety, improve transportation efficiency, and reduce air pollution. The National Highway Traffic Safety Administration (NHTSA) predicts that the safety applications enabled by V2X technology could eliminate or mitigate the severity of up to 80 percent of non-impaired crashes, significantly reducing the nearly 37,000 lives lost and three million injuries that occur annually on U.S. roadways.

This is particularly important given the sharp increase in roadway fatalities and injuries that occurred in 2020, while traffic volume itself was significantly reduced. Preliminary estimates from the National Safety Council (NSC) on roadway fatalities and crashes show that 42,060 people died on U.S. roads last year—an eight percent increase from the previous year. The fatality rate increased by 24 percent, which is the highest increase in nearly 100 years. This loss of life is not only tragic—it is unnecessary and preventable. ITS America, the U.S. Department of Transportation (USDOT), and the transportation safety community have repeatedly demonstrated that V2X technologies are the best tool in our toolbox to dramatically reduce fatalities; no other presently available transportation safety improvement has the potential to so substantially reduce crashes on American roads.

Furthermore, V2X technologies have the potential to significantly improve safety for vulnerable road users such as pedestrians and bicyclists, increasing transportation equity by preventing collisions that occur in low income and minority communities in urban and rural areas. Pedestrian traffic fatalities have increased by 51 percent from 2009 to 2019, accounting for 17.2 percent of all traffic deaths in 2019. Additionally, cyclist fatalities have increased by 36 percent since 2010. These statistics are even more disturbing in low income and minority communities. Between 2009 and 2018, pedestrian deaths rose 69 percent in urban areas, and cycling deaths increased by 48 percent. In 2019, most pedestrian traffic deaths—82 percent—occurred in urban settings. Latino cyclists face fatality rates 23 percent higher than whites do, and for African Americans, they are 30 percent higher. Low-income, Black, and Latino communities also have higher vehicular traffic volumes, trucking routes, major arterial roads, intersections that are unsafe or impassable by foot or bike, and an overall lower level and quality of walking and cycling infrastructure.

Some of the most promising V2X applications are designed to address these problems and enhance safety for vulnerable road users. For example, V2X applications can provide a warning to a driver when someone is about to cross a crosswalk in their path and improves the operation of advanced safety features. It is important to note that analysis by ITS America's Future of V2X Working Group suggests that advanced Vehicle-to-Pedestrian (V2P) applications will be unlikely to fit within the 30 MHz remaining under the FCC's proposed spectrum reallocation, threatening to eliminate these applications as tools to make roads safer for all users and to increase transportation equity within the United States at a time when the status quo has allowed fatalities in these groups to dramatically increase over the last decade.

V2X technology will also provide real economic savings by significantly reducing the more than \$830 billion in annual costs associated with crashes on American roads. Furthermore, this technology is uniquely capable of reducing traffic congestion through prioritized traffic signal timing, truck platooning, and crash reduction, reducing travel time and delays for commuters and commerce alike, delays that cost the Nation more than \$166 billion annually according to USDOT. Non-recurring incidents are responsible for 55 percent of U.S. traffic congestion—if V2X is widely deployed and these incidents are eliminated or dramatically reduced, emission levels and congestion would dramatically decrease. Preserving the spectrum for V2X would provide greater economic and environmental benefits for the American people than reallocating the spectrum for unlicensed devices.

The United States has led the world in creating V2X technology and in developing the standards that enable and support V2X technology. The FCC's proposal would cede American leadership as countries around the world are building out their V2X networks. There is no doubt that, if implemented, the Notice of Proposed Rule-making (NPRM) would undercut the public and private investments that have been made in the United States, stifle further innovation, and challenge American global competitiveness. This approach is in direct conflict with efforts underway in other parts of the world. At precisely the same time that other countries are reiterating their commitment to V2X technology and, in many cases, looking to increase the amount of spectrum available to support V2X technology, the FCC is poised to take action that would all but ensure that the technology would not realize its full potential in the United States.

The comments and reply comments submitted to the FCC in response to the NPRM overwhelmingly opposed repurposing spectrum away from transportation safety. In fact, more than 85 percent of the commenters opposed the FCC's proposal, including state and city departments of transportation, automakers, vehicle suppliers, technology companies, law enforcement, first responders, safety advocates, engineers, telecommunications companies, the drone industry, and many others. These groups asked the FCC to heed USDOT's warnings that this plan would not allow sufficient spectrum for V2X to function, threatening the significant safety benefits this technology provides.

ITS America is the association in which transportation and technology intersect. Our members are state, city, and county transportation agencies, public transit, automakers, technology companies, infrastructure firms, and research universities—ITS America is the only transportation organization that brings all these stakeholders together. They are focused on research, manufacturing, and the safe deployment of intelligent transportation technologies to save lives, improve mobility, increase accessibility and equity, promote sustainability, and improve efficiency and productivity.

AASHTO is a nonprofit, nonpartisan association representing transportation departments in the 50 states, the District of Columbia, and Puerto Rico. AASHTO serves as a liaison between state departments of transportation and the Federal government. It represents all transportation modes including: air, highways, public transportation, active transportation, rail, and water. Its primary goal is to foster the development, operation, and maintenance of an integrated national transportation system. AASHTO works to educate the public and key decision makers about the critical role that transportation plays in securing a good quality of life and sound economy for our Nation.

ITS America and AASHTO stand ready to work with the Committee on Commerce, Science, and Transportation Subcommittee on Surface Transportation, Maritime, Freight, and Ports on preserving critical transportation safety communications in the 5.9 GHz band for today's transportation system, including vehicle safety communications that can reduce fatalities and injuries on our Nation's roads, and tomorrow's transportation system, including transportation safety communications for autonomous vehicles.

Sincerely,

SHAILEN BHATT,  
ITS America.  
JIM TYMON  
AASHTO.

Cc:

The Honorable Amy Klobuchar  
The Honorable Richard Blumenthal  
The Honorable Brian Schatz  
The Honorable Ed Markey  
The Honorable Tammy Baldwin  
The Honorable Tammy Duckworth  
The Honorable Jon Tester  
The Honorable Tammy Duckworth  
The Honorable Jon Tester  
The Honorable Raphael Warnock  
The Honorable John Thune  
The Honorable Roy Blunt  
The Honorable Dan Sullivan  
The Honorable Todd Young  
The Honorable Ron Johnson  
The Honorable Shelley Moore Capito  
The Honorable Rick Scott  
The Honorable Cynthia Lummis  
Joung H Lee, Director of Policy and Government Relations, American Association of State Highway and Transportation Officials, jlee@aaashto.org  
Ron Thaniel, Vice President of Public Policy and Legislative Affairs, ITS America, rthaniel@itsa.org

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PREPARED STATEMENT OF CHRIS R. SWONGER, PRESIDENT AND CEO, FOUNDATION FOR ADVANCING ALCOHOL RESPONSIBILITY AND DISTILLED SPIRITS COUNCIL OF THE UNITED STATES

The Foundation for Advancing Alcohol Responsibility (Responsibility.org) and the Distilled Spirits Council of the United States (DISCUS) are proud to support the Reducing Impaired Driving for Everyone (RIDE) Act (S. 1331), sponsored by Senator Luján (D–NM) and Senator Scott (R–FL). This legislation has the potential to virtually eliminate drunk driving when installed as standard equipment in all new motor vehicles according to a study from the *Insurance Institute for Highway Safety published in July 2020*.

Drunk driving deaths are preventable. Over the last 40 years many laws have been passed and countless programs implemented to successfully reduce drunk driving fatalities by 52 percent from 21,113 in 1982 to 10,142 in 2019. However,

progress has stalled over the last decade and those more than 10,000 deaths and many more injuries every year demand bold action.

More than 15 years ago, efforts began to develop advanced vehicle technology to prevent a drunk driver from operating a vehicle. The goal was to create a passive technology to automatically detect impairment, that would be unobtrusive to sober drivers, accurate, reliable and affordable. Now, technology exists to achieve this goal. There are two types of technologies that hold promise:

- *Driver monitoring* can detect signs of distracted, impaired or fatigued driving. For example, Volvo is adding sensors and cameras to its vehicles aimed at enhancing safety by monitoring drivers for signs of being drunk, impaired by drugs or distracted and intervening to prevent crashes.
- *Alcohol detection* uses sensors to determine that a driver is at or above the legal blood alcohol concentration (BAC) limit of .08 and then prevents the vehicle from moving.

The RIDE Act is a technology-neutral approach that mandates a rulemaking process at the National Highway Traffic Safety Administration (NHTSA). This will allow the best technologies to be tested and to determine their feasibility, and ultimately help ensure installation of this lifesaving technology throughout new vehicles. Additionally, the RIDE Act allows NHTSA to request time extensions if needed. The House companion bill, the Honoring Abbas Family Legacy to Terminate Drunk Driving Act, referred to as the HALT Act, already passed the U.S. House of Representatives last year as part of the transportation infrastructure bill and was reintroduced (H.R. 2138) in the 117th Congress on March 23, 2021.

Americans support the use of this safety detection technology as standard equipment in all new vehicles to prevent drunk driving, according to a nationwide poll conducted by Ipsos for Mothers Against Drunk Driving® (MADD) this March. The survey found that:

- Nine of 10 Americans support technology that is integrated into a car's electronics to prevent drunk driving (89 percent say it is a good or very good idea).
- Three of four (77 percent) back Congressional action to require this technology in all new vehicles.
- Eight of 10 (83 percent) believe that new auto safety features should be standard in vehicles as they become available, not part of optional equipment packages.

A federally mandated safety standard is needed to move this lifesaving technology from the research and development stage into an installation requirement for all new automobiles.

In conclusion, DISCUS and Responsibility.org are dedicated to eliminating drunk and impaired driving from America's roadways. We know bold, innovative approaches are required to reduce crashes and save lives. New technology ultimately may help prevent drunk, drugged, and multiple substance-impaired driving, as well as distracted driving and fatigued driving. The RIDE Act would help bring this technology to American automobiles and is fundamental to preventing impaired driving fatalities in the future.

#### **About Responsibility.org**

Responsibility.org is a national not-for-profit that aims to eliminate drunk driving and work with others to end all impaired driving, eliminate underage drinking, and empowers adults to make a lifetime of responsible alcohol choices as part of a balanced lifestyle. Responsibility.org is funded by the following distillers: Bacardi U.S.A., Inc.; Beam Suntory Inc.; Brown-Forman; DIAGEO; Edrington, Mast-Jägermeister US, Inc.; Moët Hennessy USA; Ole Smoky, LLC; and Pernod Ricard USA. For more than 30 years, Responsibility.org has transformed countless lives through programs that bring individuals, families, and communities together to inspire a lifetime of responsible alcohol choices. To learn more, please visit [www.Responsibility.org](http://www.Responsibility.org).

#### **About the Distilled Spirits Council of the United States (DISCUS)**

The *Distilled Spirits Council of the United States* is the leading voice and advocate for distilled spirits in the U.S., advocating on legislative, regulatory and public affairs issues impacting the distilled spirits sector at the local, state, Federal and international levels. DISCUS members are committed to responsibility and encourage adults who drink to do so in moderation.

PREPARED STATEMENT OF IAN JEFFERIES, PRESIDENT AND CHIEF EXECUTIVE  
OFFICER, ASSOCIATION OF AMERICAN RAILROADS

### Introduction

On behalf of the members of the Association of American Railroads (AAR), thank you for the opportunity to submit this statement for the record. AAR members include the Class I freight railroads, many short line railroads, Amtrak and various commuter railroads. AAR unites these organizations in working toward a single goal: to ensure that railroads remain the safest, most efficient, cost-effective, and environmentally sound mode of transportation in the world.

Unlocking the potential of automated technology to reduce or eliminate human error is just as important for railroads as it is for other transportation modes, and we encourage the Department of Transportation (DOT) to include the Federal Railroad Administration (FRA) and the railroad industry in such discussions. The development of new technologies, including autonomous vehicles, offers the unique opportunity to dramatically improve the safety of our Nation's roads. These, along with similar technologies, can also help to address many of the challenges our Nation faces in improving our freight-moving capabilities to meet the needs of tomorrow. It is essential that Congress and DOT facilitate the development and incorporation of these technologies with a focus on both goals.

### Autonomous Vehicles and Highway-Rail Grade Crossings

A highway-rail grade crossing is a location where a railway and roadway intersect at the same level. There are over 205,000 of these crossings in the United States, and, unfortunately, in 2020, there were more than 1,800 grade crossing collisions, resulting in 675 injuries and 202 fatalities.

AAR and its members have worked diligently to improve the safety of motor vehicle drivers, passengers, and pedestrians at grade crossings, and the railroads remain committed to trying to eliminate grade crossing incidents. AAR promotes the 3 "E"s of grade crossing safety: education of the public about the dangers around railways, including through public safety education and awareness campaigns conducted by Operation Lifesaver; enforcement of traffic laws related to crossing signs and property laws related to trespassing; and engineering research and innovation to improve the safety of crossings. The railroads' efforts have contributed to a 59 percent reduction in the number of annual grade crossing collisions over the last 25 years. Regardless of these efforts and advances in train control systems, the vast majority of these accidents are due to mistakes or poor choices made by motor vehicle drivers. As the FRA has indicated, nearly all deaths at rail-highway grade crossings are preventable, explaining that "94 percent of train-vehicle collisions can be attributed to driver behavior or poor judgment."<sup>1</sup>

Unfortunately, in most cases, trains simply cannot stop in time to avoid vehicles or pedestrians at grade crossings, which is why motor vehicles are legally required to yield to trains at crossings. Autonomous vehicles have the potential to substantially improve grade crossing safety by reducing or eliminating human error by motor vehicle drivers. For this to happen, though, automated vehicle systems must be designed to recognize and respond appropriately to warning devices and approaching trains. In this regard, AAR encourages DOT and Congress to ensure that autonomous motor vehicles have the following capabilities:

First, autonomous vehicles should be able to recognize when they are approaching any grade crossings, including private crossings, by identifying the various signs and pavement markings associated with crossings. Sufficient technological redundancies should be in place to ensure autonomous vehicles have the capability to make these determinations in all weather conditions, in all road conditions, and when signage is missing.

Second, autonomous vehicles should be able to detect approaching trains and account for any variables that might obstruct their view. In addition to the visual detection of approaching trains, autonomous vehicles should be able to recognize other signs of the presence of a locomotive and/or train, such as locomotive headlights, horns, and bells.

Third, autonomous vehicles should not begin crossing tracks unless they will be able to fully move through them. Stopping on tracks because of traffic queueing or other causes creates a dangerous situation that can be prevented with highly automated vehicle technology.

<sup>1</sup> Federal Railroad Administration, Office of Railroad Policy and Development, Report No. RR-16-10 Analysis of Grade Crossing Accidents Resulting in Injuries and Fatalities May 2016; available online at: [https://railroads.dot.gov/sites/fra.dot.gov/files/fra\\_net/15767/RR\\_GX%20Task%20Force\\_Data%20Analysis\\_Final.pdf](https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/15767/RR_GX%20Task%20Force_Data%20Analysis_Final.pdf).

Last, whenever practical, the autonomous systems controlling the vehicles must be designed to route the Autonomous Vehicle (AV) over grade separated crossings (where public roadways and railroad rights-of-way are physically separated by underpass, bridge, or other infrastructure), or to avoid traveling over grade crossings altogether. This will eliminate the risk of a motor vehicle's potential collision with a train at an at-grade crossing.

The DOT and the National Science and Technology Council (NSTC) recently jointly released a follow-up to AV 3.0 entitled, *Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0 (AV 4.0)*. Among other things, AV 4.0 establishes Federal guidelines for the development and integration of automated vehicles, with a focus on prioritizing safety and security, promoting innovation, and ensuring a consistent regulatory approach.

The unified guidance contained in AV 4.0 will be extremely helpful in this effort, and the rail industry commends DOT and the NSTC for producing this important document. Railroads are disappointed, though, that AV 4.0—unlike AV 3.0—is completely silent on the critical issue of highway-rail grade crossings. Railroads hope this omission does not reflect a diminishment in the DOT's recognition that the above-mentioned capabilities into highly automated vehicles will save lives. It is imperative that Congress and DOT encourage and foster the development of such technologies.

### **The Importance and Benefits of a Level Playing Field**

The promise of autonomous technology is not confined to just passenger and commercial vehicles, but offers opportunities for safety improvement in all modes of transportation, such as rail, aviation, and maritime.

Competition in the freight transportation marketplace is fierce. Railroads welcome this competition because railroads offer a winning combination of price and service that freight customers want. To ensure that customers continue to reap the benefits of this robust competition for their businesses, however, government should not pick winners and losers by creating policies that artificially shift freight from one mode to another.

This principle extends to the regulatory and policy framework surrounding the development and implementation of autonomous or highly automated vehicles. DOT's AV 4.0 guidance focuses mostly on motor vehicles and highways, however, and does not make reference to freight rail transportation. Nor does it mention FRA or list that agency among the DOT "[k]ey modal agencies that are most relevant to surface transportation AVs."<sup>2</sup>

Railroads respectfully suggest that the same openness to the development of autonomous technology and regulatory modernization should apply to all modes of transportation and that FRA should be considered a key modal agency relevant to surface transportation AVs.

For example, automation promises to significantly enhance other areas of rail safety beyond grade crossings. Automated technologies can detect a wider range of defects, respond faster, and provide a larger window for action than a safety system that is subject to the limitations inherent in human eyes, minds, and hands. Automated track inspections can reduce track defects, leading to fewer accidents. Likewise, automated inspection of locomotives and freight cars has been shown to reduce the occurrence of broken wheels and other mechanical problems.

Unfortunately, though, due to the current limited regulatory framework, many new technologies can only be used in conjunction with, rather than as a replacement for, manual inspections required by existing FRA regulations. Railroads can sometimes obtain a temporary FRA waiver from existing regulations, but that process is often cumbersome and uncertain. These regulations discourage investment in innovative technologies.

Because automation in the rail industry is new and unfamiliar, regulators will be pressured to identify and resolve every possible risk before allowing testing or early deployment. That pressure must be resisted because hesitation will come at a cost to safety. DOT recognized this in the context of autonomous vehicles in its initial AV 4.0 guidance, when it claimed that "delaying or unduly hampering . . . testing until all specific risks have been identified or eliminated means delaying the realization of global reductions in risk."<sup>3</sup> AV 4.0 also explains, "the U.S. Government will modernize or eliminate outdated regulations that unnecessarily impede the development of AVs—or that do not address critical safety, mobility, and accessibility

<sup>2</sup>National Science & Technology Council and the U.S. Department of Transportation, *Autonomous Vehicles 4.0: Ensuring American Leadership in Automated Vehicle Technologies*, p. 8.

<sup>3</sup>*Autonomous Vehicles 4.0*, p. 4.



needs—to encourage a consistent regulatory and operational environment.”<sup>4</sup> Unlocking the many potential benefits of automated technology is just as important for railroads as it is for other transportation modes.

### **General Principles for the Regulation of Automated Technologies**

In formulating a regulatory framework that ensures a level playing field for all modes of transportation and that encourages the realization of the benefits of emerging technologies, railroads urge Congress and DOT to adhere to several principles.

First, limited short-term waivers from existing regulations do not give industry sufficient confidence to invest in new technologies. Regulatory barriers must be overcome in ways that are more enduring than waivers. For example, Congress could direct DOT to make permanent long-standing waivers whose value has been proven through successful implementation. Additionally, DOT could issue waivers of indefinite duration and provide procedures for the expedited conversion of time-limited waivers to permanent waivers or final rules if equivalent or improved safety has been demonstrated. Indeed, DOT already employs such a process in its regulation of hazardous materials transportation.

Second, to the greatest extent possible, carriers and equipment manufacturers should be permitted to continue to create voluntary standards for safety technology. No one has a greater stake in the success of new safety technologies than carriers and their suppliers, and market pressures already incentivize them to create and implement safety technologies that work.

Third, new regulations governing automated operations in the transportation sector should be performance-based, rather than prescriptive. This will focus industry attention and effort on the outcome, rather than on how that outcome is achieved. Performance standards would give the industry discretion to experiment with new ways to improve safety, while still being subject to DOT oversight, which would oversee goal setting, ensure that measures and data are accurate, and impose sanctions if carriers failed to meet their safety targets. As such, employees, customers, and the public at large would still be fully protected. Railroads commend *AV 4.0* for recognizing the desirability of performance-based standards in the AV realm. *AV 4.0* states, “When regulation is needed, the U.S. Government will seek rules . . . that are as performance-based and nonprescriptive as possible.” Further, AAR commented favorably on National Highway Traffic Safety Administration’s advanced notice of proposed rulemaking for automated driving systems, which took just such an approach.

Fourth, regulation of automated operations should occur at the Federal level to avoid a patchwork of state and local rules that would create confusion and inhibit the deployment of key technologies. *AV 4.0* is correct on this point when it calls for regulators to “. . . promote regulatory consistency among state, local, tribal and territorial, and international laws and regulations so that AVs can operate seamlessly nationwide and internationally.” In the rail industry, state and local laws governing rail safety and operations are already (and appropriately) preempted by Federal law and regulation. It is especially critical to the efficient functioning of the national rail network that the principle of a uniform set of national regulations is not undercut by state or local laws targeting autonomous or highly automated technologies associated with rail operations.

Finally, as with any new technology, public fear of the unknown is often unfounded but can prove to be a major obstacle. The public can and will read much into what DOT and FRA say, or do not say, on the issue of automated technologies. We urge DOT, FRA, and other policymakers—including members of this Committee and others in Congress—to support innovation and work to facilitate the realization of the benefits of these technologies.

### **Conclusion**

Autonomous vehicles and highly automated technologies can make our society safer and the movement of freight more efficient than it has ever been. These improvements must be accomplished by technology that recognizes when a vehicle is approaching a highway-rail grade crossing, responds appropriately to an approaching train and/or grade crossing warning device, then recognizes when it is safe to proceed over a crossing. It is essential that DOT and Congress set goals for the incorporation of certain essential capabilities, while also providing a regulatory environment that incentivizes industry to be constantly developing new, and improving existing, technologies.

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<sup>4</sup>*Id.* at 8.

RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. KLOBUCHAR TO  
RANA ABBAS TAYLOR

***Distracted Driving.*** According to the Centers for Disease Control and Prevention (CDC), eight people die and more than one thousand people are injured every day in crashes involving distracted driving.

***Question.*** In your testimony, you highlight driver monitoring technologies in cars that use cameras to detect drowsy or distracted drivers. In your view, how significant could these new technologies be in combating drunk driving?

**Answer.** Thank you for this question. One of the significant findings from our research into different technologies, as outlined in our NHTSA RFI document, is that many of the available automated safety technologies are applicable equally well to both drunk and drug impaired driving AND to drowsy and distracted driving. This is especially true of the driver monitoring camera systems, installed in the interior of the automobile. This technology can detect drunk and drug impaired drivers by measuring the dilation of the eyes, and by identifying the failure of eyes to focus on driving. This technology can also detect drowsy and distracted driving through measuring how long eyes are closed, how long eyes are distracted from watching the road, and how frequently the head bobs. If programmed properly, these systems are also capable of safely pulling the car to the side of the road in either case of drunk and drug impaired driving, or drowsy and distracted driving. These internal driver monitoring camera systems are standard equipment in many models today—including Volvo, Mercedes, Jaguar Land Rover, Subaru, Cadillac, etc.

The effectiveness of the driver monitoring camera systems mentioned above can be enhanced through integration with the standard ADAS driving monitoring technologies that are now available on virtually ALL new cars. Common features of these driving monitoring systems are lane assist, emergency braking, blind spot alerts, rear cameras, adaptive cruise control, etc. These standard driving monitoring technologies can combine data from driver monitoring with driving behavior, such as improperly crossing lanes and, if programmed properly, thereby react more quickly and correctly. When combined together, these technologies can eliminate the vast majority of both drunk and drug impaired driving AND drowsy and distracted driving.

Please see the NHTSA RFI document for details. Please see the Volvo video for an example of how this technology works. Thank you.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. JON TESTER TO  
JOHN BOZZELLA

***Research and Development.*** In Montana, the photonics industry supports jobs across sectors from basic R&D at Montana State University to companies like self-driving startup Aurora which is using cutting-edge lidar technology developed in Bozeman. These technologies keep our military and commercial industries competitive internationally which is critical to our national security. American leadership in core automotive technologies needs to remain in the U.S. It is surprising to learn that at least three Chinese companies have been approved to test on public roads in California.

***Question 1.*** What do we need to be focused on to help AV companies succeed and build their businesses here in the U.S. instead of in Germany or China?

**Answer.** Leadership in automotive technology has underpinned a century of U.S. economic growth, employing nearly 10 million Americans. The continuation of U.S. leadership is critical to the long-term health of our economy and to job creation in the future. Today, American companies are market leaders in AV development, but we must not lose sight of the fact that this is a global competition that will define the future of the automotive industry. Companies are reaching a point in their development where they need to make critical decisions about their future. The U.S. has led the development of these technologies but as companies and technologies mature, they need a pathway to scale their development. As I noted in my written testimony—The nations that lead the development and adoption of innovative technologies will also shape supply chains, define global standards and, potentially, reshape the international marketplace.

Foreign nations, like China, have signaled their intension to capitalize on the economic impacts of COVID-19 to dominate the race for leadership in AV development—among other technologies. In this highly competitive, capital-intensive industry, market certainty will become even more critical for maintaining U.S. leadership in automotive innovation in advanced safety technologies, as well as vehicle efficiency and electrification.

AV companies in the United States are safely testing vehicles in California, Arizona, Nevada, Texas, Florida, Michigan, Pennsylvania and elsewhere, and are making significant investments to carry that forward. A Federal framework for the responsible, safe development and deployment of AVs in the United States is essential to support that effort and to ensuring the U.S. maintains its market leadership. Lastly, these related safety advancements also hold great promise in helping to reduce the 96 percent or vehicle crashes that are attributed to human error.

Last year, Auto Innovators put out an AV Policy Roadmap, which included 14 policy recommendations that can be enacted at various levels of government, including the Federal Government, to facilitate the safe testing and deployment of AVs on our roadways. Enacting a Federal framework that provides for full-scale testing and deployment of highly automated vehicles on U.S. roadways is central to preserving U.S. leadership and competitiveness in the development, testing, and deployment of these life-saving technologies

**Auto Connectivity.** In Montana, drivers deal with a number of issues including unreliable cell coverage, snow, and mountain and isolated roads.

*Question 2.* How are you taking these challenges into account?

Answer. When designing V2X and other advanced vehicle technologies, automakers and suppliers take many variables into account, including these challenges. To support consistent vehicle connectivity, our Nation's digital infrastructure should be updated and routinely maintained across diverse regions of the country. In the meantime, areas with unreliable cell coverage will continue to see safety benefits from advanced vehicle technologies, such as Advanced Driver Assistance Systems (ADAS), or in the future, fully automated systems. Such driver assistance systems, including V2X, will benefit consumers who are driving in any number of challenging driving environments, including snow.

*Question 3.* How are you involving rural America in the development and testing of AV technology?

Answer. Automated vehicle technologies will improve safety, mobility, and economic opportunity wherever you are: rural or urban settings. In our AV Policy Roadmap we also provide a number of recommendations, including updates to the Manual of Uniform Traffic Control Devices and associated grant programs to support the implementation of infrastructure that will benefit road safety and future technologies, including AVs. These grants could go to a wide range of communities, encouraging more widespread testing and deployments in more diverse locations—both rural and urban.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RAPHAEL WARNOCK TO  
JOHN BOZZELLA

**Connected Vehicles.** Georgia is a leader in testing and deploying connected vehicle (CV) technology on its roads. The Georgia Department of Transportation (GDOT) is working with the Metropolitan Atlanta Rapid Transit Authority (MARTA) and the Georgia Regional Transportation Authority (GRTA) to install CV technology on their buses to help transit vehicles operate more efficiently and stay on schedule. Not only does this technology help improve public transportation bus service, but it can enhance safety for all road users. Broad adoption of CV technology can be used to warn vehicles of impending collisions with other vehicles, as well as for other safety applications.

As you know, connected vehicle technologies require dedicated spectrum to be effective, and that the 5.9 GHz band had long been reserved for transportation safety technologies, like CV. However, last year, the Federal Communications Commission (FCC), over the objections of the U.S. Department of Transportation and safety advocates, voted to give away the majority of the spectrum needed for these technologies, directly threatening the ability of these technologies to reduce fatalities.

*Question 1.* Could you speak to your organization's view of the FCC's actions in this matter?

Answer. Vehicle-to-everything ("V2X") communication technologies promise to deliver significant safety and societal benefits to the American public, including reducing automotive crashes and fatalities and producing economic, environmental, and transportation efficiencies.

Without access to spectrum in the 5.9 GHz band, the transportation industry will not be able to realize the full potential of this technology to save lives. The FCC's current proposal would not only reduce the amount of spectrum available, but there is also indication that it would result in harmful interference into the remaining part of the spectrum—making it essentially unusable for transportation safety.

Last year, in advance of the FCC's decision, Auto Innovators announced an industry-wide commitment to dramatically increase utilization of the 5.9 GHz band by deploying at least five million V2X devices within five years. This buildout commitment clearly demonstrates that lifesaving V2X technologies are ready and can be deployed in significant numbers in the next five years and beyond.

The automotive industry has also reached consensus on a proposed band plan for the 5.9 GHz spectrum. This landmark industry consensus resolves the debate over which communication protocol, DSRC or C-V2X, should support V2X in the United States. Our proposal permits both technologies to make beneficial and efficient use of the 5.9 GHz spectrum band in the near-term, while also "future-proofing" for next generation auto safety technologies that are already under development and nearing deployment.

Both the buildout commitment and proposed band plan are premised on the FCC preserving all 75 MHz of spectrum within the 5.9 GHz band for V2X technologies.

*Question 2.* Do you believe that this spectrum reallocation would undermine transportation safety?

Answer. Please see above response.

***Interstate Highways.*** When the Interstate System was developed in the 1950s, the government facilitated a regulatory environment in which private entrepreneurs could financially benefit from investing in gas stations located off highway exits. As a result, drivers of gas-fueled cars rarely feel "range anxiety" due to an abundance of fueling options that are often paired with additional commercial offerings, and amenities.

*Question 3.* Do you believe it is important to incentivize private businesses to invest in expanding EV charging capacity, ultimately mirroring the availability of gas stations throughout our transportation network?

Answer. Collaboration between all stakeholders, both public and private, in support of a comprehensive, national vision and strategy will be critical in realizing the necessary conditions for a successful EV market. This national strategy should include a number of items that support building a robust market for battery, plug-in hybrid and fuel cell electric vehicles, including investments such as Federal tax incentives, grants, rebates and other mechanisms to spur significant charging infrastructure development in the following key areas: homes (both single family and multi-unit dwellings), workplaces, highway, and other public locations. Investments and funding to encourage hydrogen refueling infrastructure should also be considered.

Incentivizing private businesses to invest in charging infrastructure is one component of an approach to spur charging infrastructure, which is important for both current and potential EV drivers. Studies have shown that consumers considering the purchase of an EV believe the technology to be ready now when they report seeing charging infrastructure and are more comfortable driving them knowing that there is a charging network in place. One effective Federal policy tool to support these types of investments would be the establishment of a grant program to build public charging and hydrogen refueling infrastructure along the Federal Highway System by expanding alternative fuel corridors. Ensuring access to abundant charging and hydrogen refueling infrastructure will serve the dual purpose of increasing "convenience parity" between EVs and the internal combustion counterparts, while also alleviating consumer concerns about "range anxiety."

*Question 4.* How can Congress engage the private market to help build out our national network of electric vehicle charging infrastructure at off-highway businesses and ensure safe access for all commuters?

Answer. We recently sent a letter to President Biden, along with MEMA and the UAW, outlining the bold, comprehensive national strategy that will be required to establish the U.S. as a leader in the next generation of clean transportation innovation. Demand-side policies that incentivize wider-scale EV adoption, build out the necessary infrastructure, and facilitate consumer awareness are essential components to EV market expansion. Equally important to the long-term success of the EV market in the U.S. will be investments in supply-side policies that ensure greater supply chain availability and resiliency, increased availability of critical minerals, and expanded manufacturing capacity for EVs in the United States.

On the question of charging and hydrogen refueling infrastructure, as I noted above, investments such as Federal tax incentives, grants, rebates, and other funding mechanisms are needed to spur significant refueling infrastructure development in the following key areas: homes (both single family and multi-unit dwellings), workplaces, highway, and other public locations. There is a role for utilities, electric vehicle supply equipment providers, and private businesses to leverage funding opportunities and greatly expand EV charging availability throughout the U.S. As part

of our *March 29th EV policy letter* to the Administration, we outlined several Federal policies that will help address the availability of charging and hydrogen refueling infrastructure. Of the policies outlined, examples which could incentivize off-highway infrastructure include:

- Extend the duration of and expand the 30C Federal Tax Credit for alternative fuel vehicle refueling property (including multiple charge points at a single location), which supports electric vehicle supply equipment (EVSE) and hydrogen fueling infrastructure.
- Establish a grant program to build public charging and hydrogen refueling infrastructure along the Federal Highway System by expanding alternative fuel corridors. Additionally, grant programs could also serve a similar purpose along secondary roads and within metropolitan areas.
- Direct the Secretary of Energy to make loan guarantees for EVSE and hydrogen refueling infrastructure.

In addition, building codes will be important to ensuring that new and retrofitted construction is required to be EV-ready. This encourages installation of the necessary electrical infrastructure at the most cost-effective point of application and will leverage the opportunity for private businesses to quickly and easily install charging stations when needed.

We look forward to working with Congress, the Administration and other public and private stakeholders to craft and implement a comprehensive plan that includes both the supply-and demand-side policies necessary to realize the transition to a cleaner transportation future.

**Semiconductor Shortage.** As you know, there is a global semiconductor shortage impacting our automotive manufacturing industry and putting hundreds of thousands of American jobs at risk. West Point, Georgia, is home to Kia Motor's only American manufacturing facility. The factory normally runs 24 hours a day, employs more than 2,700 staff, and produces 340,000 vehicles per year. In April, this Kia factory almost had to suspend production for two days due to the global semiconductor shortage. The Endless Frontier Act would increase research into semiconductor design and fabrication, as well as protect America's supply chains. For America to remain competitive, we must build public-private partnerships to invest in research and development.

*Question 5.* How have your members been impacted by the semiconductor supply chain shortage and are there any ways to mitigate these impacts in the short-term?

*Answer.* Semiconductors are currently used in a wide and growing variety of automotive electronic components that perform vehicle control, safety, emissions, driver information, and other functions. Many innovations that are underway in the automotive space will define the future of mobility—including electrification, automation, and connectivity—and are highly dependent on semiconductors. With the increased incorporation of new safety and further emission reduction technologies, there is no doubt that auto production represents a growth sector for the semiconductor industry.

The chips that are generally used in vehicles are not the same chips used in consumer electronics devices. As with many defense and industrial control users, auto production largely relies on chips made using mature nodes. These chips are more robust and reliable than the advanced node chips that are used in consumer electronics devices and, as a result, can withstand the challenging environments in which vehicles operate and can last the life of a vehicle.

The microchip shortage that the auto industry is facing is an outgrowth of the unprecedented shutdown in auto production that occurred in the early weeks of the COVID pandemic. During that eight-week shutdown across all North America manufacturing plants (and similar shutdowns across the globe), silicon wafer foundries reallocated capacity away from auto grade chips to chips used in consumer electronics and other products. As you are aware, auto production has since resumed. However, the auto industry's demand for auto grade chips is not currently being met.

The microchip supply shortage facing the auto industry has been further exacerbated in recent weeks by severe weather in Texas that impacted domestic suppliers, a fire at a major overseas chip supplier, congestion at West Coast ports, and the significant stoppage of global trade through the Suez Canal shipping route. These additional challenges have further strained the existing supply of auto grade chips and have bolstered industry concerns and economic impacts.

The chip shortage has forced a number of automakers to halt production and cancel shifts in the United States, with serious consequences for their workers and the communities in which they operate. Our immediate priority, and one that we appre-

ciate is shared by the Administration and Congress, is reducing the severity and longevity of the microchip shortage for the auto industry in order to protect American jobs and minimize the negative impact to the broader economy.

We have been conducting anonymized surveys of our member companies since the onset of the chip shortage. The most recent survey was conducted within the last couple of weeks and, unfortunately, the high end projections indicate an even more significant impact to United States auto production than was projected in previous surveys. This survey, which is generally aligned with recent projections made by IHS Markit<sup>1</sup> and AlixPartners<sup>2</sup>, revealed that the projected impact for 2021 could be as high as 1.276 million fewer vehicles produced. While there is no consensus among our member companies on how long the shortage will continue to impact production, some companies are predicting up to 6 more months of additional disruption.

The current supply chain crisis has clearly exposed overall capacity limits in the semiconductor sector and revealed significant risks in the current automotive semiconductor supply chain. There is undeniably a need to expand semiconductor capacity to meet the growing demand for semiconductors in the auto industry, as well as other sectors across the economy.

*Question 6.* Do you agree legislation like the Endless Frontier Act would help address the long-term concerns about semiconductor supply chain issues?

Answer. Congress should explore any opportunity to provide the robust funding necessary to support the CHIPS for America Act provisions included in the FY2021 NDAA. Consistent with the authorizing language in the FY 2021 NDAA, these programs benefit all industries and sectors critical to U.S. national interests—not just those that rely on advanced node chips. As you may be aware, the chips that are generally used in vehicles are not the same chips used in consumer electronics devices. As with many defense and industrial control users, auto production largely relies on chips made using mature nodes. These chips are more robust and reliable than the advanced node chips that are used in consumer electronics devices because they must withstand challenging internal and external environments for the life of the vehicle.

Semiconductors are integral to current auto production and future automotive innovation (including electrification, automation, and connectivity). To help mitigate the risks to the automotive supply chain evidenced by the current chip shortage, we suggest that at least some portion of such funding be used to build new capacity in the United States that will support the auto industry, as well as other sectors that rely on mature nodes—including defense, medical, and critical infrastructure. This could be accomplished by, for example, specifying that a particular percentage—that is reasonably based on the projected needs of the auto industry—be allocated for facilities that will support the production of auto grade chips in some manner.

New foundries take years to build, so Auto Innovators also recommends that policies be implemented that support increased chip capacity in the mid-term. This includes enactment of a semiconductor manufacturing investment tax incentive. Such an incentive can help companies offset the cost of creating new lines within existing facilities or reallocating current production to meet evolving needs.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. CYNTHIA LUMMIS TO  
JOHN BOZZELLA

*Background.* Over the past twenty years since Congress set aside the 75 megahertz for intelligent safety technology, there have been few benefits to drivers from the deployment of this technology. The primary driver for the FCC's November order was the underutilization of the band during that time-period. Your organization has requested that all 75 megahertz remain allocated to these technologies despite the underutilization.

*Question 1.* What assurances can you provide Congress that this underutilization will not continue into the future?

Answer. Recognizing the safety and societal benefits that V2X technology can bring, automotive manufacturers have already deployed or announced deployments utilizing the 5.9 GHz Safety Spectrum band in the United States and around the world. These commitments and efforts represent a clear desire and intent by the automotive industry to use the spectrum and highlight the progress that has been made towards the widespread deployment of V2X. In fact, the companies with deployed or announced deployments account for over 60 percent of the automotive market share in the United States. It is noteworthy that this activity has occurred

despite uncertainty from U.S. regulators over the last eight years about the continued availability of the entire 5.9 GHz band for V2X.

In April of last year, the Alliance for Automotive Innovation made a groundbreaking V2X deployment commitment to expedite further V2X deployments within the 5.9 GHz band. Auto Innovators members committed to the deployment of 5 million radios on vehicles and roadway infrastructure within 5 years if the Federal Communications Commission maintains all 75 MHz of spectrum for transportation safety and take action to permit cellular vehicle-to-everything (C-V2X) and dedicated short-range communication (DSRC) to co-exist in the 5.9 GHz band.

*Question 2.* Many automakers have moved away from DSRC technologies in favor of C-V2X. Is it your position that both DSRC and C-V2X should be allowed to operate on the band?

Answer. Some automakers have expressed a preference for C-V2X technologies and other automakers have expressed a preference for DSRC technologies. Last year, Auto Innovators released a consensus band plan to resolve the debate over which communication protocol should support V2X in the United States. The band plan would have allowed LTE C-V2X to operate exclusively in the upper 20 MHz of the 5.9 GHz band, DSRC to operate exclusively in the lower 20 MHz of the 5.9 GHz band, and the remaining 30 MHz in the middle of the band to be made available on a priority basis to Next-Gen DSRC and Advanced (5G) C-V2X applications as they are developed and deployed. After five years, a single technology (whether DSRC or LTE C-V2X and their respective future iterations) would be selected and, after a phaseout of the technology that did not prevail, have access to the entire 5.9 GHz band.

This market-driven band plan would permit both technologies to make beneficial and efficient use of the 5.9 GHz spectrum band in the near-term, while also “future-proofing” for next generation auto safety technologies that are already under development and nearing deployment. Through the selection of a single technology within a defined period, the plan will soon put the industry in position to maximize benefits for consumers and promote the most efficient use of the band going forward.

*Question 3.* When Congress first dedicated the 75 megahertz for transportation technologies, it listed several functions that it envisioned occurring on that spectrum. However, many of the functions envisioned at that time are already occurring outside of the band such as lidar and other sensors. Do the remaining safety functions require the full 75 megahertz in order to operate as intended?

Answer. Estimates from transportation safety stakeholders indicate that significantly more than 30 MHz of spectrum will be required to support V2X technologies. This includes applications that were not conceived of when the spectrum was first allocated, such as Collective Perception Messages and Maneuver Coordination Messages to support driving automation and applications to support pedestrians and other vulnerable road users. Research by the European Automobile Manufacturers Association and European Association of Automotive Suppliers demonstrate that at least 47 MHz of spectrum is needed for safety critical communications in typical urban scenarios and approximately 77 MHz is required in more complex urban scenarios. The 5G Automotive Association also estimates that V2X applications will require between 70 and 75 MHz to support basic safety use cases and more advanced safety use cases.

*Question 4.* In your testimony, you indicated that 5 million C-V2X devices could be deployed in the short term. However, with more than 270 million registered vehicles on our roadways, does this 5 million device deployment constitute a significant advancement of this technology?

Answer. 5 million vehicles constitutes a significant advancement of this technology and represents a significant number of new vehicles sales in the U.S. We believe that—following this deployment—consumer demand for V2X technologies will continue to grow. We also believe that there may be a role for aftermarket V2X devices to be installed on vehicles that are already in the market.

*Question 5.* Is this technology dependent upon having all vehicles utilizing this technology together, or could a single vehicle reap the benefits of the technology even if adjacent roadway users are not similarly equipped?

Answer. There will be an immediate benefit for any vehicle that is equipped with the technology that comes into contact with another vehicle equipped with the technology or with roadside infrastructure (e.g., a traffic light, etc.) that is equipped with the technology. But, V2X technology is a cooperative technology meaning that the more vehicles equipped, the larger the benefit. While deployment across the entire fleet is not required, as more vehicles and infrastructure are equipped, the benefits will increase.

*Question 6.* How will this technology be deployed in rural areas where cellular service cannot be as readily relied upon as in more densely populated areas?

Answer. V2X technology will be deployed in the same manner in rural and urban areas, and everywhere in between. It is a point-to-point communication technology and does not require continuous access to a cellular service to operate.

*Question 7.* You indicated concerns in the hearing with out of band emissions interfering with the remaining 30 megahertz dedicated to transportation safety technology. Could you please provide additional information and examples of how the restrictions put in place during the FCC's November order would not be sufficient to protect the 30 mhz from harmful interference?

Answer. Many transportation safety stakeholders have raised serious questions about the adequacy of the limits set by the Commission to protect V2X from harmful interference. For example, Ford Motor Company submitted extensive laboratory, field, and simulation tests showing that unlicensed devices in the lower 45 MHz can cause harmful interference to V2X safety applications and concluded that much stricter limits were required to "ensure reliable reception of ITS safety messages." These test results are consistent with other tests, including the Federal Communications Commission's own Phase 1 test results and testing by the U.S. Department of Transportation.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RAPHAEL WARNOCK TO  
ANN WILSON

**Connected Vehicles.** Georgia is a leader in testing and deploying connected vehicle (CV) technology on its roads. The Georgia Department of Transportation (GDOT) is working with the Metropolitan Atlanta Rapid Transit Authority (MARTA) and the Georgia Regional Transportation Authority (GRTA) to install CV technology on their buses to help transit vehicles operate more efficiently and stay on schedule. Not only does this technology help improve public transportation bus service, but it can enhance safety for all road users. Broad adoption of CV technology can be used to warn vehicles of impending collisions with other vehicles, as well as for other safety applications.

As you know, connected vehicle technologies require dedicated spectrum to be effective, and that the 5.9 GHz band had long been reserved for transportation safety technologies, like CV. However, last year, the Federal Communications Commission (FCC), over the objections of the U.S. Department of Transportation and safety advocates, voted to give away the majority of the spectrum needed for these technologies, directly threatening the ability of these technologies to reduce fatalities.

*Question 1.* Could you speak to your organization's view of the FCC's actions in this matter?

Answer. MEMA was very disappointed when the Federal Communications Commission (FCC) decided to split the 5.9 GHz band. MEMA and many of our members commented extensively in the FCC Docket (ET Docket No. 19-138). The decision gives the lower 45 MHz to unlicensed uses like WiFi and would transition the upper 30 MHz away from Dedicated Short-Range Communications (DSRC) service over to Cellular Vehicle-to-Everything (C-V2X). MEMA argued that FCC's analysis in its draft report and order was not reasoned decision-making. MEMA further noted that additional capacity for Wi-Fi is not necessary, particularly in light of the recent FCC action in the 6 GHz proceeding to open an additional 1,200 MHz of spectrum, which more than tripled the spectrum available for Wi-Fi. Additionally, MEMA noted that the draft order fundamentally alters licenses for ITS applications.

MEMA stated: "In sum, the Draft Order is a fatally flawed policy proposal that offers no real benefits to consumers on closer examination, and it will prevent significant deployment of ITS technology." Moreover, MEMA added that, "The Draft Order is overwhelmingly opposed by multiple Federal agencies, every state department of transportation, broad cross sections of industry and consumer protection groups, and raises serious international harmonization and trade concerns."

MEMA is planning to submit comments to the FCC's latest Federal Register notices.

*Question 2.* Do you believe that this spectrum reallocation would undermine transportation safety?

Answer. In short, yes. While the public docket on this subject was massive, it all boils down to the overwhelming majority of stakeholders in the proceeding agreeing that the Commission's decision will make ITS applications unusable because of harmful interference and will eliminate spectrum already necessary to handle existing applications. One of the consistent themes expressed by commenters is one of



alarm: given the critical role ITS technology can play to drastically reduce the tens of thousands of traffic fatalities and millions of injuries annually, the Commission appears to be consciously avoiding the need to examine the consequences of its proposals or supporting it with actual data.

Moreover, federal, state, and local governments have already invested billions of dollars in developing and deploying ITS technology under the Commission's rules. Not only would the Commission's rules wipe out these significant public investments, it would actually require state and local governments to incur an additional \$645 million in costs to "rip and replace" existing ITS infrastructure to comply according to the U.S. Department of Transportation.

**Interstate Highways.** When the Interstate System was developed in the 1950s, the government facilitated a regulatory environment in which private entrepreneurs could financially benefit from investing in gas stations located off highway exits. As a result, drivers of gas-fueled cars rarely feel "range anxiety" due to an abundance of fueling options that are often paired with additional commercial offerings, and amenities.

*Question 3.* Do you believe it is important to incentivize private businesses to invest in expanding EV charging capacity, ultimately mirroring the availability of gas stations throughout our transportation network?

Answer. Public-private partnerships are an essential component to effectively building out EV charging infrastructure and integrating more EVs in the transportation system. Federal incentives for U.S. manufacturing are critical. The Federal government should provide funding and support for infrastructure but each state and locality will need to examine the policies and structures that best meets its unique needs. Federal programs should allow for flexibility in decision-making by states and localities. This will ensure that EV drivers have access to charging infrastructure no matter where they are traveling. There should be more processes for Federal and state governments to talk with U.S. manufacturers with technical capability and connect them to help build this infrastructure.

The U.S. needs to develop well-connected and accessible system with many types of Direct Current (DC)Fast Charging options, whether located at public charging stations, nonresidential, or nonworkplace sites. DC Fast Charging Stations are a critical part of the U.S.'s shift to EVs.

Congress should also consider medium-and heavy-duty fleet infrastructure needs, including charging depots, that will require significant up-front investments despite a long-term benefit. The medium-and heavy-duty EV market does not yet have the availability as with light vehicles, and Federal support will help early adoption and spur innovation and further private investment.

*Question 4.* How can Congress engage the private market to help build out our national network of electric vehicle charging infrastructure at off-highway businesses and ensure safe access for all commuters?

Answer. Congress should fund building out EV infrastructure. Expanding charging infrastructure will require collaboration across sectors and allow for the variety of public-private partnerships necessary to meet demand across different use cases and geographic regions. Coordination between end users of the EV charging infrastructure and their local energy company will maximize public and private investments and can improve cost-effective roll-out.

MEMA recommends Congress consider:

1. Increasing economic development incentives to support the U.S. manufacturers of DC Fast Chargers since the charger itself makes up half the cost of DC Fast Charger deployment. Government support will enable U.S. manufacturers to accelerate innovation and production of charging systems domestically.
  - a. There needs to be more incentives that support domestic manufacturing of DC Fast Chargers in addition to the proposed updates to 48C tax credits. Currently, much of the Federal funding is focused on property owners who install EV Chargers.
  - b. Policies should encourage U.S. manufacturing of infrastructure.
2. Providing resources and programs to assist vehicle industry to upskill their current U.S. workforce. This is critical to the future of EVs and EV infrastructure and should include employer-driven workforce training programs. Some examples of the training include a combination of mechanical and electronic engineering and high-voltage training is needed.
3. Increasing property owner installation incentives and implementing incentives, including grants and rebates, for the manufacturing DC Fast Charging stations which would accelerate the market adoption of DC fast Chargers. Direct Cur-

rent (DC) Fast Charging is critical to addressing barriers for mass adoption and consumer acceptance of electric vehicles.

4. Supporting all levels of charging in order to achieve a critical mass of charging stations could help the consumer acceptance and achieve a faster market adoption of electric vehicles.

**Semiconductor Shortage.** As you know, there is a global semiconductor shortage impacting our automotive manufacturing industry and putting hundreds of thousands of American jobs at risk. West Point, Georgia, is home to Kia Motor's only American manufacturing facility. The factory normally runs 24 hours a day, employs more than 2,700 staff, and produces 340,000 vehicles per year. In April, this Kia factory almost had to suspend production for two days due to the global semiconductor shortage. The *Endless Frontier Act* would increase research into semiconductor design and fabrication, as well as protect America's supply chains. For America to remain competitive, we must build public-private partnerships to invest in research and development.

*Question 5.* How have your members been impacted by the semiconductor supply chain shortage and are there any ways to mitigate these impacts in the short-term?

Answer. The impacts of the semiconductor chip shortage have rippled throughout the U.S. motor vehicle supply chain. Lower than anticipated vehicle production is expected to continue into the third and fourth quarters of this year. This will result in closures and lower more episodic employment for motor vehicle supplier facilities.

Motor vehicle suppliers are temporarily closing plants across the country for short or longer periods of time and then reopening. This uncertainty is exacerbating the shortage of skilled workers facing the industry as companies find it difficult to rehire workers after shutdowns. Instead, workers are going elsewhere for more consistent employment.

The Biden Administration's efforts to encourage more rapid growth in production of motor vehicle grade chips globally include working with our allies and key producing countries as well as individual chip and wafer companies to encourage more rapid growth in production of motor vehicle grade chips. Additional motor vehicle chip production and short-term shifts from other types of semiconductor chips are necessary. However, effective short solutions are difficult in a strong economy with high demand for consumer electronics chips, motor vehicle chips and those for other sectors. We hope that recently scheduled government convened discussions between motor vehicle manufacturers and suppliers with semiconductor and wafer companies can yield progress.

*Question 6.* Do you agree legislation like the *Endless Frontier Act* would help address the long-term concerns about semiconductor and other supply chain issues?

Answer. The *Endless Frontier Act* with the inclusion of the Peters Amendment language on the CHIPS Act will help address long-term concerns about semiconductor availability for the industry. Additionally, other supply-chain needs may be addressed by the abstract research and development provisions and critical technology commercialization prioritized in the *Endless Frontier Act*.

At the same time, great care must be taken in the allocation of the \$50 billion in CHIPS Act funding. The full \$15–20 billion to construct fabs for state-of-the-art chips is important to ensure our country's competitiveness. However, the overall industrial base must also be protected. The Peters Amendment to provide \$2 billion for legacy chip fab construction will assist key sectors important to the U.S. overall and defense industrial base such as motor vehicle and aerospace production. MEMA urges the Senate to retain this language in the final bill.

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RESPONSE TO WRITTEN QUESTION SUBMITTED BY HON. AMY KLOBUCHAR TO  
REUBEN SARKAR

***Distraction Driving.*** Distracted driving is responsible for more than 58 percent of teen crashes. I introduced legislation to help more states qualify for grants to prevent distracted driving.

*Question 1.* What has your experience taught you about the importance of educating drivers, especially teens, about the dangers of distracted driving?

Answer. The American Center for Mobility (ACM) concurs that distracted driving, particularly with respect to teenage drivers, is an issue that must be addressed through more education. That is why ACM in partnership with The B.R.A.K.E.S. (Be Responsible And Keep Everyone Safe) organization, hosted two weekend Teen Driver Training events in 2019 with 400 students in attendance along with their parents and have two additional weekend events to be held in May and October of 2021. B.R.A.K.E.S. is a non-profit 501(c)3 whose mission is to prevent injuries and

save lives by training and educating teenage drivers and their parents about the importance of safe and responsible driving. Over the past 12 years, BRAKES organization has trained over 45,000 students who are now less likely to be in a crash in their first three years of driving. ACM intends to continue to partner with B.R.A.K.E.S. and similar organizations.

B.R.A.K.E.S. works closely with the Department of Transportation and the local and state police to determine which curriculum will be the most beneficial for teen drivers. The curriculum and training provided are reflective of the most current data on teen automobile crashes and fatalities. The B.R.A.K.E.S. Teen Driver Training is designed to train and educate teenage drivers and their parents about the importance of safe and responsible driving. B.R.A.K.E.S. training consist of five hands-on exercises one of which, the Distraction Exercise, is specifically targeted towards distracted driving. The distraction curriculum forces a driver to negotiate a tightly coned course while being distracted by the instructor. The curriculum is designed to demonstrate just how dangerous cell phones, text messaging, music, traffic, and friends in the car can be for drivers. The other four portions of the curriculum include exercises in crash avoidance/slalom, drop wheel/off road recovery, panic stop, and car control and skid recovery.<sup>1</sup>

In addition to ACM's efforts on public education, ACM is focused on the development, testing and validation of advanced mobility technologies that aim to improve driver safety. ACM has worked with automotive companies at our smart mobility test center to evaluate driver engagement technologies that can be used to reduce driver distraction and improve vehicle safety. ACM has tested systems that detect for driver distraction and help to ensure drivers remain alert when behind the wheel. These test scenarios required a safe method to be established for operating a vehicle on a closed track facility while intentionally distracting a driver with tasks that are known to be a risky to perform while driving, such as texting. ACM also tested systems at night to monitor driver's ability to stay awake. These "drowsy driver" systems help to ensure the operator is alert, while behind the wheel. In most cases the driver monitoring was accomplished with a vision system that used facial expression software to assess participants level of distraction or drowsiness.

The American Center for Mobility supports Senator Klobuchar's legislation to help more states qualify for grants to prevent distracted driving.

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RESPONSE TO WRITTEN QUESTIONS SUBMITTED BY HON. RAPHAEL WARNOCK TO  
REUBEN SARKAR

**Connected Vehicles.** Georgia is a leader in testing and deploying connected vehicle (CV) technology on its roads. The Georgia Department of Transportation (GDOT) is working with the Metropolitan Atlanta Rapid Transit Authority (MARTA) and the Georgia Regional Transportation Authority (GRTA) to install CV technology on their buses to help transit vehicles operate more efficiently and stay on schedule. Not only does this technology help improve public transportation bus service, but it can enhance safety for all road users. Broad adoption of CV technology can be used to warn vehicles of impending collisions with other vehicles, as well as for other safety applications.

As you know, connected vehicle technologies require dedicated spectrum to be effective, and that the 5.9 GHz band had long been reserved for transportation safety technologies, like CV. However, last year, the Federal Communications Commission (FCC), over the objections of the U.S. Department of Transportation and safety advocates, voted to give away the majority of the spectrum needed for these technologies, directly threatening the ability of these technologies to reduce fatalities.

*Question 1.* Could you speak to your organization's view of the FCC's actions in this matter?

Answer. The November 18, 2020 FCC decision to make the lower 45-megahertz band within the 5.850—5.895 GHz spectrum available for unlicensed uses and to allocate the upper 30 MHz for Cellular Vehicle-to-Everything (C-V2X), thereby obsoleting Dedicated Short-Range Communications (DSRC), appears to have been more of a judgement call based on perceived cost-benefit for allowing unlicensed use within the spectrum in comparison to a retrospective view on DSRC adoption over the past twenty-years. It does not appear to be a purposeful assessment as to the efficacy and adequacy of C-V2X to address vehicle safety related issues using only a 30 MHz band as in comparison to the full, dedicated 75 MHz band that allowed for

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<sup>1</sup>About / B.R.A.K.E.S. Teen Driver's Training For Safe Driving and Accident Prevention ([putonthebrakes.org](http://putonthebrakes.org))

DSRC. In other words, the FCC decision appears to have preceded a comprehensive study to validate the impact on V2X applications.

The American Center for Mobility (ACM) is a leading, state-of-the-art smart mobility test center for the research, testing and validation of industry standards for new mobility technologies such as connected and autonomous vehicles. ACM is equipped with an intelligent transportation system (ITS) network based on DSRC but not yet updated for C-V2X. ACM is now in the process of reinvesting into C-V2X based on the FCC ruling to enable such testing and validation by our automotive and government customers. To date, only very high-level conceptual demonstrations with industry partners have been performed at ACM on point-to-point communications using C-V2X. No Federally funded research has been completed using ACM as a test bed on C-V2X. While ACM is ultimately technology agnostic as to which V2X solution is employed, we can say that we have not performed any extensive testing or validation of C-V2X and therefore cannot provide an objective data driven perspective on the impact of the FCC decision. It does seem reasonable and prudent, however, that more exposure to the technology coupled with testing and validation should have been performed ahead of the FCC decision.

*Question 2.* Do you believe that this spectrum reallocation would undermine transportation safety?

Answer. It is the American Center for Mobility's view that more objective data through structured programs for purposeful study are required to fully understand the impact of the FCC spectrum reallocation decision on transportation safety. The approach that was taken by FCC places the study of the impact after the decision has already been made. As a result, transportation safety improvements enabled through connectivity could be a foregone conclusion if C-V2X falls short of delivering a comprehensive effective solution or if interference from unlicensed devices in adjacent bands disrupt safety critical messages.

The two main issues with FCC's proposal are that it may not allow for the full suite of anticipated V2X applications and may not adequately protect the V2X spectrum from interference from adjacent bands. The Intelligent Transportation Society of America (ITSa) recent paper analysis of spectrum requirements in their preliminary 30 MHz application map found that while some V2X applications such as Basic Safety Messages (BSM) would likely be deployed in the 30 MHz band, other Message Types such as Collective Perception Messages (CPM), Maneuver Coordination Messages (MCM), and Personal Safety Messages (PSM) would likely be lost.<sup>2</sup>

Smart Mobility Testing Centers such as ACM, on the heels of FCC's decision, are only now starting to implement C-V2X capabilities that can be used to evaluate their effectiveness in vehicle safety but have not started any major testing programs. Significant testing or validation of C-V2X technologies has not yet been performed at ACM except for limited high-level demonstrations. However, considerable corporate and federally funded work has been performed using DSRC technologies.

For example, ACM conducted Federally funded research on the platooning of class 8 trucks in real-world conditions using V2V communications based on DSRC. Cooperative platooning of trucks is dependent on real-time V2V communications which enables close following distances that can enable considerable fuel efficiency gains while remaining within a safe operating envelope. The opening of the spectrum can cause disruptions to V2V communications that result in significantly decreased reliability of the real-time data needed for these types of cooperative driving applications.<sup>3</sup> While it may be possible to update DSRC to C-V2X, it is unclear how the limitation to 30 MHz would impact performance, and if results of this research would translate. Additional closed track and real-world testing is also needed to ensure that the 30MHz spectrum is not encumbered by interference from out-of-band emissions from adjacent spectrum bands, as evidenced from USDOT's Technical Assessment.<sup>4</sup>

It is ACM's view that there is not enough objective information from purposeful studies to assess the impact to transportation safety resulting from the from the FCC ruling, and that more purposeful work through NHTSA and other agencies is required.



<sup>2</sup> <https://itsa.org/wp-content/uploads/2021/01/Application-Map-Webinar-PowerPoint-Presentation-FINAL.pdf>

<sup>3</sup> *Performance of DSRC V2V Communication Networks in an Autonomous Semi-Truck Platoon Application*

<sup>4</sup> <https://www.transportation.gov/sites/dot.gov/files/docs/research-and-technology/360181/oobe-energy-59-safety-band-final-120619.pdf>