

**THE FUTURE OF AUTOMATED COMMERCIAL  
MOTOR VEHICLES: IMPACTS ON SOCIETY, THE  
SUPPLY CHAIN, AND U.S. ECONOMIC LEADER-  
SHIP**

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(118-26)

**HEARING**  
BEFORE THE  
SUBCOMMITTEE ON  
HIGHWAYS AND TRANSIT  
OF THE  
COMMITTEE ON  
TRANSPORTATION AND  
INFRASTRUCTURE  
HOUSE OF REPRESENTATIVES  
ONE HUNDRED EIGHTEENTH CONGRESS  
FIRST SESSION

SEPTEMBER 13, 2023

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Committee on Transportation and Infrastructure  
U.S. House of Representatives  
Washington, DC 20515

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SEPTEMBER 8, 2023

**SUMMARY OF SUBJECT MATTER**

TO: Members, Subcommittee on Highways and Transit  
FROM: Staff, Subcommittee on Highways and Transit  
RE: Subcommittee Hearing on “*The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership*”

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I. PURPOSE

The Subcommittee on Highways and Transit of the Committee on Transportation and Infrastructure will meet on Wednesday, September 13, 2023, at 10:00 a.m. ET in 2167 of the Rayburn House Office Building to receive testimony on “*The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership*.” The purpose of this hearing is to allow Members of the Subcommittee to explore the impact of automated commercial motor vehicle (CMV) deployment and its potential impact on our economy, the transportation and logistics industry, and supply chains, while enhancing safety and maintaining American leadership in the AV industry. The Subcommittee will hear from Aurora Innovations, Inc.; the Autonomous Vehicle Industry Association (AVIA); the American Trucking Associations (ATA); and Advocates for Highway Safety.

II. BACKGROUND

Automated vehicles (AVs), including self-driving cars and automated trucks and buses, are vehicles in which the safety-critical control functions (e.g., steering, acceleration, or braking) can occur without direct driver input and enable autonomous operation.<sup>1</sup> The AV marketplace is a dynamic and rapidly evolving sector, and AV deployment has the potential to revolutionize transportation and the supply chain by offering increased efficiency, safety, and convenience.<sup>2</sup> The market is attracting significant investment from established automotive manufacturers, technology companies, and startups. With current research, regulatory developments, and infrastructure investments, the AV marketplace is poised for growth, and will transform transportation systems and the future movement of people and goods. According to the United States Department of Transportation (DOT), there were roughly 1,400

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<sup>1</sup>NAT'L HWY. TRAFFIC SAFETY ADMIN., *Crash Avoidance Automated Vehicles*, available at <https://one.nhtsa.gov/Research/Crash-Avoidance/Automated-Vehicles>.

<sup>2</sup>John Leonard, et. al., *Autonomous Vehicles, Mobility, and Employment Policy: The Roads Ahead*, MIT TASK FORCE ON WORK OF THE FUTURE, (July 2022), available at <https://workofthefuture.mit.edu/wp-content/uploads/2020/11/2020-Research-Brief-Leonard-Mindell-Stayton3.pdf>.

AVs operating nationwide in 2019.<sup>3</sup> By the end of 2022, there were 1,500 AVs operating in California alone.<sup>4</sup> Beyond California, there are robust ongoing AV operations in Arizona, Texas, Nevada, and elsewhere.<sup>5</sup> There are approximately 84 AV companies active in the United States, operating in 30 states and 120 cities.<sup>6</sup>

### III. AV TECHNOLOGIES

#### SYSTEMS—

AVs generally work by using a combination of three systems:

- A *global positioning system* (GPS) or other mapping system that defines the starting and ending point of the drive;
- A *sensor system* composed of cameras, lasers, radar, or lidar (a technology that measures distance using laser light) that detects dynamic and variable roadway conditions; and
- A *computer system* that can turn the information from the mapping system and sensor systems into a driving action, which is typically executed by the vehicle's internal electronic network.<sup>7</sup>

#### LEVELS OF AUTOMATION—

The Society of Automotive Engineers International developed six standardized, internationally adopted definitions to describe levels of automation in motor vehicles. These levels are:

- Level 0 ... The human driver does all the driving.
- Level 1 ... An advanced driver assistance system (ADAS) on the vehicle can sometimes assist the human driver with either steering or braking/accelerating, but not both simultaneously.
- Level 2 ... An ADAS on the vehicle can itself actually control both steering and braking/accelerating simultaneously under some circumstances. The human driver must continue to pay full attention (“monitor the driving environment”) at all times and perform the rest of the driving tasks.
- Level 3 ... An Automated Driving System (ADS) on the vehicle can itself perform all aspects of the driving task under some circumstances. In those circumstances, the human driver must be ready to take back control at any time when the ADS requests the human driver to do so. In all other circumstances, the human driver performs the driving task.
- Level 4 ... An ADS on the vehicle can itself perform all driving tasks and monitor the driving environment—essentially, do all the driving—in certain circumstances. The human need not pay attention in those circumstances.
- Level 5 ... An ADS on the vehicle can do all the driving in all circumstances. The human occupants are just passengers and need never be involved in driving.<sup>8</sup>

Only vehicles equipped with levels 3, 4, or 5 automation are considered automated vehicles. The combination of hardware and software that automates control functions of AVs is called the automated driving system (ADS).<sup>9</sup> Vehicles with levels 0–2 automation are considered equipped with automated driver assistance systems

<sup>3</sup>Darrell Etherington, *Over 1,400 self-driving vehicles are now in testing by 80+ companies across the US*, TECH CRUNCH, (June 11, 2019), available at <https://tcn.ch/3fUunoP>.

<sup>4</sup>STATE OF CALIFORNIA DEPARTMENT OF MOTOR VEHICLES, *2022 Autonomous Milage Reports*, available at [https://urldefense.com/v3/https://www.dmv.ca.gov/portal/file/2022-autonomous-mileage-reports-csv/;!!Bg5easoyC-OI2vIEqY8mTBrtW-N4OJKAQ!LMKJz4QhIaowG5Kw\\_5cXjA1ip2H1NAsefQaL3UDwP5SXTp7KvZLuHoNFTzRDg64Zjsp1FK4Ef85M3z\\_fkC\\_7FRqsX7sRjc-UA4I8](https://urldefense.com/v3/https://www.dmv.ca.gov/portal/file/2022-autonomous-mileage-reports-csv/;!!Bg5easoyC-OI2vIEqY8mTBrtW-N4OJKAQ!LMKJz4QhIaowG5Kw_5cXjA1ip2H1NAsefQaL3UDwP5SXTp7KvZLuHoNFTzRDg64Zjsp1FK4Ef85M3z_fkC_7FRqsX7sRjc-UA4I8).

<sup>5</sup>*Ready to Launch, Autonomous Vehicles in the U.S.*, ALLIANCE FOR AUTOMOTIVE INNOVATION, (December 2022), available at <https://www.autosinnovate.org/posts/papers-reports/AV%20Report.pdf>.

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

<sup>7</sup>*How Self-driving Cars Work: Sensor Systems*, UDACITY, (Mar. 3, 2021), available at <https://www.udacity.com/blog/2021/03/how-self-driving-cars-work-sensor-systems.html>.

<sup>8</sup>*Id.*

<sup>9</sup>NAT'L HWY. TRAFFIC SAFETY ADMIN., *Automated Vehicles for Safety*, available at [https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#:~:text=An%20automated%20driving%20system%20\(ADS,human%20driver%20to%20do%20so](https://www.nhtsa.gov/technology-innovation/automated-vehicles-safety#:~:text=An%20automated%20driving%20system%20(ADS,human%20driver%20to%20do%20so) [hereinafter AVs for Safety].



(ADAS). Many vehicles available today are equipped with some automation (levels 1–2), which includes features such as automatic emergency braking and lane centering.<sup>10</sup> Although there are vehicles equipped with level 3 automation, level 4 and 5 are not yet commercially available. However, many trucking companies have partnered with self-driving technology firms and are testing trucks with level 4 service, and some jurisdictions are providing level 4 autonomous transit service.<sup>11</sup>

#### IV. SAFETY ENHANCEMENT

AVs have the potential to drastically increase vehicle safety and reduce motor vehicle crashes and deaths. In 2021, 42,939 people were killed in motor vehicle crashes on the Nation’s roadways, equating to a fatality rate of 1.37 per 100 million vehicle miles traveled (VMT).<sup>12</sup> Deaths associated with large truck crashes totaled 5,788 in 2021.<sup>13</sup> Crashes involving large trucks represented approximately 13 percent of the total fatal crashes and large truck VMT represented approximately 10 percent of total VMT of all motor vehicles.<sup>14</sup> However, the critical pre-crash event for nearly three-quarters of fatalities involving large trucks crashes was another vehicle, person, animal, or object in the large truck’s lane or encroaching into it.<sup>15</sup> The remaining one-quarter of the large truck crashes had critical pre-crash events of their own movement or loss of control, and 87 percent was due to driver behavior (speeding, lack of sleep, inattentiveness, etc.).<sup>16</sup>

The National Highway Traffic Safety Administration (NHTSA) estimated that total fatalities and the fatality rate on the Nation’s roadways decreased to 42,795 and 1.35 per 100 million VMT in 2022; however, roadway traffic crashes continue to be a leading cause of death for people ages 1–54.<sup>17</sup> Although there has been significant progress in incorporating safety features in both vehicles and infrastructure, enacting traffic safety laws reinforced with public and driver education, and improved health care outcomes; traffic fatalities have not fallen below 32,479 (2011) or below a rate of 1.08 per 100 million VMT (2014).<sup>18</sup>

DOT’s research has indicated that up to 94 percent of serious crashes involve human factors.<sup>19</sup> However, last year the Chair of the National Transportation Safety Board (NTSB) criticized that statistic as “misleading.”<sup>20</sup> More recently, the General Services Administration (GSA) states that 98 percent of crashes are caused by human error.<sup>21</sup> In 2021, NHTSA’s data showed that deadly crashes due to behav-

<sup>10</sup>SAE Levels of Driving Automation™ Refined for Clarity and International Audience, SAE INTERNAT’L., (May 3, 2021), available at <https://www.sae.org/blog/sae-j3016-update>.

<sup>11</sup>Cumberland CID Launches Autonomous Shuttle Pilot Program, Plans for Future Growth, Cumberland Community Improvement District, (Jul. 25, 2023), available at <https://cumberlandcid.org/cumberland-cid-launches-autonomous-shuttle-pilot-program-plans-for-future-growth/>.

<sup>12</sup>NAT’L HWY TRAFFIC SAFETY ADMIN., *Overview of Motor Vehicle Traffic Crashes in 2021*, (April 2023), available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813435>.

<sup>13</sup>DOT, NAT’L HWY. TRAFFIC SAFETY ADMIN., *Traffic Safety Facts 2021 Data, Large Trucks*, (June 2023), available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813452>.

<sup>14</sup>*Id.*

<sup>15</sup>DOT, FED. MOTOR CARRIER SAFETY ADMIN., *Large Truck and Bus Crash Facts*, (2019), available at <https://www.fmcsa.dot.gov/safety/data-and-statistics/large-truck-and-bus-crash-facts-2019#:~:text=Below%20is%20a%20summary%20of%20some%20of%20the,percent%20between%202009%20and%202019.%20...%20More%20items>.

<sup>16</sup>*Id.*; DOT, FMCSA, *Large Truck Crash Causation Study*, (July 2007), available at <https://www.fmcsa.dot.gov/safety/research-and-analysis/large-truck-crash-causation-study-analysis-brief>

<sup>17</sup>See NAT’L HWY. TRAFFIC SAFETY ADMIN., *Traffic Safety Facts*, (Apr. 2023), available at [https://www.cdc.gov/injury/features/global-road-safety/index.html](https://www.nhtsa.gov/press-releases/traffic-crash-death-estimates-2022#:~:text=The%20National%20Highway%20Traffic%20Safety%20Administration%20has%20released,as%20compared%20to%2042%20939%20fatalities%20reported%20for%202021; CENTERS FOR DISEASE CONTROL AND PREVENTION, <i>Road Traffic Injuries and Deaths—A Global Problem</i>, (Jan. 10, 2023), available at <a href=).

<sup>18</sup>CENTERS FOR DISEASE CONTROL AND PREVENTION, *Achievements in Public Health, 1900–1999 Motor-Vehicle Safety: A 20th Century Public Health Achievement*, (May 14, 1999), available at <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4818a1.htm>; *Fatality Facts 2021 Yearly Snapshot*, INSURANCE INSTITUTE FOR HWY. SAFETY, (May 2023), available at <https://www.iihs.org/topics/fatality-statistics/detail/yearly-snapshot>.

<sup>19</sup>DOT, NAT’L HWY. TRAFFIC SAFETY ADMIN., *2016 Fatal Motor Vehicle Crashes: Overview*, (Oct. 2017), available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812456>.

<sup>20</sup>NTSB’s *Homendy Calls DOT’s Serious Crash Stat Misleading*, TRANSPORTATION TOPICS NEWS (Jan. 18, 2022), available at <https://www.ttnews.com/articles/ntsb-homendy-calls-dots-serious-crash-stat-misleading>.

<sup>21</sup>GSA, *Crashes Are No Accident*, (last accessed Aug. 31, 2023), available at <https://drivethru.gsa.gov/DRIVERSAFETY/DistractedDrivingPosterA.pdf>.

ioral factors increased significantly.<sup>22</sup> For example, alcohol related fatalities increased by 14 percent between 2020 and 2021.<sup>23</sup> AVs can mitigate or correct driver error, and level 5 AVs have the potential to remove the need for a human driver from the chain of events that lead to a crash. Therefore, there is potential to significantly increase safety for drivers, passengers, and other road users, and reduce the economic costs of crashes.<sup>24</sup> Trucking and technology firms are currently testing the technology to ensure that AVs can and will respond appropriately in complex traffic and varying roadway conditions.<sup>25</sup>

For example, in April 2022, a driver-supervised TuSimple autonomous truck crashed into a concrete barricade on I-10 in Arizona.<sup>26</sup> TuSimple acknowledged that its computer system responded to an outdated command, and both it and the safety driver bore responsibility for the crash.

## V. INFRASTRUCTURE AND INSPECTION CHALLENGES

### INFRASTRUCTURE CHALLENGES—

Transportation officials are evaluating the role of road infrastructure in the safe deployment of AVs. The Federal Highway Administration (FHWA) is evaluating the role of infrastructure in the deployment of AVs and what Federal action may be necessary. This includes researching what data is needed to update infrastructure, modeling how AVs may impact traffic operations, and awarding grants to allow states and localities to pursue their own research.<sup>27</sup>

Stakeholders have noted that roadways and traffic control devices—which include signs and lane markings—will likely need to be in a state of good repair for optimal operation of Level 2 and Level 3 AVs.<sup>28</sup> Making improvements to roadway infrastructure will be helpful to all users.<sup>29</sup> For example, wider pavement markers could benefit older human drivers in addition to AVs.<sup>30</sup> Today, both AVs and human drivers benefit from contrasting pavement markings, especially in areas of high glare.<sup>31</sup> In addition, the Manual on Uniform Traffic Control Devices (MUTCD) sets the minimum national standard for traffic control devices on public roadways, but allows states some flexibility in how they comply with these standards.<sup>32</sup> Therefore, traffic control devices are not uniform across all states.<sup>33</sup>

FHWA is in the process of updating the National MUTCD. In December 2020, FHWA published a Notice of Proposed Rulemaking (NPRM) to amend the MUTCD with, among other modifications, new guidance focused on accommodating AVs.<sup>34</sup> This rulemaking is underway, and a proposed final rule was submitted to the Office

<sup>22</sup> DOT, NAT'L HWY TRAFFIC SAFETY ADMIN., *Overview of Motor Vehicle Traffic Crashes in 2021*, (Apr. 2023), available at <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813435>.

<sup>23</sup> *Id.*

<sup>24</sup> AVs for Safety, *supra* note 9.

<sup>25</sup> *Id.*

<sup>26</sup> Rebecca Bellan, *TuSimple Addresses Autonomous Truck Crash During Q2 Earnings Call*, TECH CRUNCH, (Aug. 2, 2022), available at <https://techcrunch.com/2022/08/02/tusimple-addresses-autonomous-truck-crash-during-q1-earnings/>.

<sup>27</sup> DOT, NAT'L SCI. & TECH. COUNCIL, *Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0*, (Jan. 2020) available at <https://www.transportation.gov/sites/dot.gov/files/2020-02/EnsuringAmericanLeadershipAVTech4.pdf> [hereinafter *Automated Vehicles 4.0*].

<sup>28</sup> Response to Fed. Hwy. Admin. Request for Information from Muhammad Amer, Dir., Transp. & Development Institute, American Society of Civil Engineers to Martin C. Knopp, Assoc. Adm'r for Operations, Fed. Hwy. Admin., (Mar. 5, 2018), available at <https://www.regulations.gov/comment/FHWA-2017-0049-0079>; Comments in the Federal Register, *Automated Driving Systems*, American Traffic Safety Services Association, (Mar. 17, 2023), available at <https://www.regulations.gov/comment/FHWA-2017-0049-0067>.

<sup>29</sup> *Addressing The Roadway Safety Crisis: Building Safer Roads For All: Hearing Before the Subcomm. on Highways and Transit of the H. Comm. on Transp. and Infrastructure*, 118th Cong. (2023).

<sup>30</sup> *Id.*

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

<sup>32</sup> See 23 U.S.C. § 109; DOT, FHWA, *Manual on Uniform Traffic Control Devices Overview*, (Sep. 14, 2022), available at <https://mutcd.fhwa.dot.gov/kno-overview.htm>; DOT, FHWA, *Who Uses the MUTCD? And How?*, (Sep. 14, 2022), available at <https://mutcd.fhwa.dot.gov/kno-users.htm>.

<sup>33</sup> Comments in the Federal Register, *Automated Driving Systems*, American Traffic Safety Services Association, (Mar. 17, 2023), available at <https://www.regulations.gov/comment/FHWA-2017-0049-0067>.

<sup>34</sup> Nat'l Standards for Traffic Control Devices: Manual on Uniform Traffic Control Devices for Streets and Highways; Revision, 23 C.F.R. pts 470, 635, 655, (Dec. 14, 2020), available at <https://www.regulations.gov/document/FHWA-2020-0001-0001>.

of Management and Budget’s Office of Information and Regulatory Affairs (OIRA) on June 13, 2023.<sup>35</sup>

*ENHANCED VEHICLE INSPECTIONS—*

Before each trip, a CMV driver must inspect their vehicle (called a pre-trip inspection) and ensure it is in safe operating condition.<sup>36</sup> After the trip, a driver must prepare and sign a post trip inspection report.<sup>37</sup> Further, every commercial vehicle, including each segment of a combination vehicle, must undergo a periodic inspection at least once every 12 months.<sup>38</sup>

Traditionally, roadside and weight inspections rely on assistance and information provided to the inspector by the CMV driver. CMV drivers may be directed to stop at a weigh station, inspection station, and/or be subject to a roadside inspection performed to the standards of a Commercial Motor Vehicle Safety Alliance (CVSA) North American Standard Inspection. CVSA trains CMV inspectors, and the Federal Motor Carrier Safety Administration (FMCSA) incorporated CVSA’s certification standards for roadside inspections, as required by the Fixing America’s Surface Transportation Act (FAST) (P.L. 114–94).<sup>39</sup>

Reflecting the changes required for inspecting automated trucks, in October 2022, CVSA announced an Enhanced CMV Inspection Program for Autonomous Truck Motor Carriers that “establishes a no-defect, point-of-origin inspection program for ADS-equipped commercial motor vehicles.”<sup>40</sup> The program, now underway, includes an enhanced inspection standard and procedure for motor carriers operating ADS vehicles and a 40-hour CVSA training course and exam for motor carrier personnel who will be conducting the inspections.<sup>41</sup>

The new inspection program requires a CVSA trained inspector to perform an enhanced pre-trip inspection before dispatch and in-transit inspections throughout the trip. In addition, the ADS vehicle is required to communicate to law enforcement while in-motion that it passed the origin/destination inspection, its automated driving systems (as a whole) are functioning, and it is operating within its operational design domain. Those ADS vehicles will then bypass fixed inspection sites. En-route roadside inspections of ADS vehicles by law enforcement officials would be limited to situations where an imminent hazard is observed or during a post-crash investigation. In addition, all ADS vehicles must be able to respond to law enforcement should an officer attempt to pull over a vehicle. Any truck, trailer, or commercial motor vehicle combination that fails the Enhanced CMV Inspection Procedure at the point of dispatch must be repaired.<sup>42</sup>

VI. REGULATORY ACTIONS

*FEDERAL ACTIONS—*

As automated vehicles are still in development, AV regulatory regimes are still in their beginning stages.<sup>43</sup> At the Federal level, AV safety is overseen by NHTSA. Although there is no overarching Federal framework for AVs, DOT has taken preliminary steps to adapt its regulatory regime. Since 2016, DOT has released several iterations of voluntary guidance for AVs, the latest being the “Automated Vehicles Comprehensive Plan” and “Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0.”<sup>44</sup> In December 2020, NHTSA published an Advance Notice of Proposed Rulemaking (ANPRM) seeking public comment on the potential development of a framework of principles to govern AV safety.<sup>45</sup>

Since private companies are in the early stages of developing, testing, and piloting AVs and AV technologies, there is little publicly available data on collision rates and

<sup>35</sup> OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, BUDGET OF THE UNITED STATES GOVERNMENT, REGULATORY ACTIONS CURRENTLY UNDER REVIEW BY AGENCY (2023).

<sup>36</sup> DOT, FED. MOTOR CARRIER SAFETY ADMIN., *The Motor Carrier Safety Planner 5.2.2 Vehicle Inspections*, available at <https://csa.fmcsa.dot.gov/SafetyPlanner/MyFiles/SubSections.aspx?ch=22&sec=65&sub=148>.

<sup>37</sup> *Id.*

<sup>38</sup> *Id.*

<sup>39</sup> Fixing America’s Surface Transportation Act of 2015, Pub. L. No. 114–94, 129 Stat. 1537.

<sup>40</sup> CVSA Announces New Enhanced CMV Inspection Program for Autonomous Truck Motor Carriers, CVSA, (Oct. 4, 2022), available at <https://www.cvsa.org/news/new-enhanced-cmv-inspection-program/>.

<sup>41</sup> *Id.*

<sup>42</sup> *Id.*

<sup>43</sup> Automated Vehicles 4.0, *supra* note 27.

<sup>44</sup> *Id.*

<sup>45</sup> Framework for Automated Driving System Safety, 49 C.F.R. pt. 571, (Dec. 3, 2020), available at <https://www.regulations.gov/document/NHTSA-2020-0106-0001>.

vehicle safety.<sup>46</sup> NHTSA encourages automated vehicle manufacturers to submit Voluntary Safety Self-Assessments (VSSAs) demonstrating their approaches to safe testing and deployment of AVs.<sup>47</sup> To date, 28 companies have submitted VSSAs to NHTSA.<sup>48</sup> NHTSA also encourages AV companies to voluntarily disclose information, including location and type of vehicle, through the Automated Vehicle Transparency and Engagement for Safe Testing (AV TEST) tracking tool.<sup>49</sup> All of this information is publicly available. In June 2021, NHTSA issued a Standing General Order that requires AV manufacturers and operators to report crashes to the agency.<sup>50</sup>

The FMCSA establishes Federal Motor Carrier Safety Regulations (FMCSRs), which set minimum safety standards for motor carriers and drivers.<sup>51</sup> In May 2019, FMCSA released an ANPRM requesting comments on FMCSRs that may need to be updated, modified, or eliminated to facilitate the safe introduction of automated commercial motor vehicles.<sup>52</sup> Potentially affected FMCSRs included Licensing and Driver Qualifications, Hours of Service, and Safe Driving.<sup>53</sup> In February 2023, FMCSA published a Supplemental Advance Notice of Proposed Rulemaking (SANPRM), asking for additional information related to topics such as vehicle inspection and maintenance, remote driver oversight, credentialing, oversight, and the need for potential drug testing requirements for remote vehicle assistants; and the potential for developers, Original Equipment Manufacturers (OEMs), and fleets to begin alerting FMCSA in real time about where they are doing testing and operations.<sup>54</sup> The SANPRM is currently under internal agency review.

Additionally, in March 2023, FMCSA announced it had received an application from Waymo LLC and Aurora Operations, Inc. for a five-year exemption from the required placement of warning devices (ex. emergency triangles) around a stopped CMV; the required steady-burning lamps for warning devices; and the ability to use a warning device for stopped vehicles is not currently allowed by FMCSA rules. Waymo and Aurora are seeking the exemption in order to operate CMVs operated by a Level 4 ADS equipped with warning beacons mounted on the truck cab in lieu of traditional warning devices placed around a stopped autonomous CMV, as required by current regulations.<sup>55</sup> The exemption request is currently under internal agency review.

#### STATE AND LOCAL ACTIONS—

In lieu of a Federal AV framework, 41 states and the District of Columbia have enacted legislation or issued executive orders related to AVs.<sup>56</sup> Most of these state actions are intended to encourage AV development and testing.<sup>57</sup> Some of these actions incorporate AVs into the state's broader regulatory framework, including oper-

<sup>46</sup>Automated Vehicles 4.0, *supra* note 27.

<sup>47</sup>NAT'L HWY TRAFFIC SAFETY ADMIN., *Automated Driving Systems 2.0: A Vision for Safety*, (Sept. 2017), available at [https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13069a-ads2.0\\_090617\\_v9a\\_tag.pdf](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/13069a-ads2.0_090617_v9a_tag.pdf).

<sup>48</sup>NAT'L HWY TRAFFIC SAFETY ADMIN., *Voluntary Safety Self-Assessment*, available at <https://www.nhtsa.gov/automated-driving-systems/voluntary-safety-self-assessment>.

<sup>49</sup>NAT'L HWY TRAFFIC SAFETY ADMIN., *AV TEST Initiative*, (last accessed Aug. 31, 2023), available at <https://www.nhtsa.gov/automated-vehicle-test-tracking-tool>.

<sup>50</sup>NAT'L HWY TRAFFIC SAFETY ADMIN., *Standing General Order on Crash Reporting for Levels of Driving Automation 2-5*, (Apr. 2023), available at <https://www.nhtsa.gov/laws-regulations/standing-general-order-crash-reporting-levels-driving-automation-2-5>.

<sup>51</sup>DOT, FED. MOTOR CARRIER SAFETY ADMIN., *The Motor Carrier Safety Planner*, available at <https://csa.fmcsa.dot.gov/SafetyPlanner/Default.aspx>.

<sup>52</sup>FED. MOTOR CARRIER SAFETY ADMIN., *Automated Driving Systems (ADS) for Commercial Motor Vehicles (CMVs); Request for Comments Concerning Federal Motor Carrier Safety Regulations (FMCSRs) Which May Be a Barrier to the Safe Testing and Deployment of ADS-Equipped CMVs on Public Roads*, (Mar. 26, 2018), <https://www.regulations.gov/docket/FMCSA-2018-0037>.

<sup>53</sup>UNITED STATES DEPT OF TRANSP., FED. MOTOR CARRIER SAFETY ADMIN., *Automated Driving Systems (ADS) Policy Development for Commercial Vehicle Operations*, FMCSA, (Mar. 10, 2021), available at <https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/2021-03/ART%20Forum%202021%20Automated%20Driving%20Systems%20Policy%20Update.pdf>.

<sup>54</sup>Safe Integration of Automated Driving Systems Equipped Commercial Motor Vehicle, 88 Fed. Reg. 6691, (Feb. 1, 2023), available at <https://www.federalregister.gov/documents/2023/02/01/2023-02073/safe-integration-of-automated-driving-systems-ads-equipped-commercial-motor-vehicles-cmvs>.

<sup>55</sup>Parts and Accessories Necessary for Safe Operation; Exemption Application From Waymo LLC, and Aurora Operations, Inc., 88 Fed. Reg. 13489,13490, (Mar. 3, 2023), available at <https://www.federalregister.gov/documents/2023/03/03/2023-04385/parts-and-accessories-necessary-for-safe-operation-exemption-application-from-waymo-llc-and-aurora>.

<sup>56</sup>*Autonomous Vehicles State Bill Tracking Database*, National Conference of State Legislatures, (Feb. 15, 2023), available at <https://www.ncsl.org/research/transportation/autonomous-vehicles-legislative-database.aspx>.

<sup>57</sup>*Id.*

ating authorities, safety standards, licensing and registration requirements, and liability laws.<sup>58</sup>

Some state legislatures have considered legislation to prohibit autonomous trucks over 10,000 pounds without a designated safety driver. Most recently in June 2023, such legislation passed the California Assembly.<sup>59</sup> Currently, the legislation is pending in the California Senate. On August 15, 2023, a letter was sent detailing Governor Newsom's Administration's opposition to the proposal.<sup>60</sup>

## VII. SUPPLY CHAIN OPPORTUNITIES

### *INCREASED EFFICIENCIES—*

Reducing crashes, and their resulting delays, would increase the efficiency of truck operations and increase the capacity and throughput on our roads.<sup>61</sup> Traffic optimization, a potential benefit of AVs, would reduce commuting times.<sup>62</sup> AVs have the potential to improve fleet utilization. For example, without a human driver, trucks could potentially run more continuously, without the need for human drivers to rest.<sup>63</sup> Further, increases in productivity resulting from AVs may result in faster delivery and quicker commuting time.<sup>64</sup> Productivity increases together with operational savings would result in lower trucking freight rates that could be passed on to the consumer.<sup>65</sup>

### *WORKFORCE IMPACTS—*

While it is difficult to determine the exact impact AVs will have on the Nation's workforce, automating the task of driving commercial motor vehicles could dramatically change professional driving careers in numerous ways. These could include altered job responsibilities and changes in wages and quality of life.<sup>66</sup>

The ATA estimated that the shortage of qualified drivers reached a near record high of 78,000 in 2022, and further forecasted that this shortage could grow to 160,000 in 2031.<sup>67</sup> ATA further reported the driver turnover rate was 91 percent in 2019, and 90 percent in 2020, and that "more than 10 million Americans held commercial driver's licenses in 2019. That was nearly triple the 3.7 million trucks that required a driver holding that certification."<sup>68</sup> A high turnover rate does not necessarily mean that a company has complete turnover; rather, it could indicate that some positions turn over multiple times.<sup>69</sup>

Other segments of the industry cite driver retention as the workforce challenge most plaguing the industry, highlighting driver wages and working conditions as ob-

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

<sup>59</sup>*Chorus Grows in Opposition of California's Proposed Driverless Truck Ban*, COMMERCIAL CARRIER JOURNAL, (Jul 10, 2023), available at <https://www.cjdigital.com/equipment-controls/autonomous/article/15541790/chorus-grows-in-opposition-of-californias-driverless-truck-ban>.

<sup>60</sup>Jeremy White, *Gavin Newsom Sides with the Robots in Autonomous Vehicle Debate*, POLITICO, (Aug. 23, 2023), available at <https://www.politico.com/news/2023/08/23/gavin-newsom-autonomous-vehicles-00112358>.

<sup>61</sup>Liao, Liu, Tang, Mu, and Huang, *Decision-Making Strategy on Highway for Autonomous Vehicles Using Deep Reinforcement Learning*, IEEE, (Sept. 2020), available at <https://ieeexplore.ieee.org/document/9190040>.

<sup>62</sup>Haotian Zhong, et. al., *Will autonomous vehicles change auto commuters' value of travel time?*, SCIENCE DIRECT, (June 2020), available at <https://www.sciencedirect.com/science/article/abs/pii/S1361920919311010#:~:text=Autonomous%20vehicles%20co>.

<sup>63</sup>DOT, *Driving Automation Systems in Long-Haul Trucking and Bus Transit*, (Jan. 2021), available at <https://www.transportation.gov/sites/dot.gov/files/2021-01/Driving%20Automation%20Systems%20in%20Long%20Haul%20Trucking%20and%20Bus%20Transit%20Preliminary%20Analysis%20of%20Potential%20Workforce%20Impacts.pdf>.

<sup>64</sup>C&D LOGISTICS, *The Benefits of Going Driverless*, (last accessed Aug. 31, 2023), available at <https://www.cdlogistics.ca/freight-news/the-benefits-of-going-driverless/>.

<sup>65</sup>NAT'L HWY TRAFFIC SAFETY ADMIN., *United States Department of Transportation Releases Preparing for the Future of Transportation: Automated Vehicles 3.0*, (Oct. 4, 2018), available at <https://www.nhtsa.gov/press-releases/us-department-transportation-releases-preparing-future-transportation-automated> [hereinafter *Automated Vehicles 3.0*].

<sup>66</sup>*Id.*

<sup>67</sup>*The State of Transportation Infrastructure and Supply Chain Challenges: Hearing Before the H. Comm. on Transp. and Infrastructure*, 118th Cong. (2023) (testimony of Chris Spear, President and Chief Executive Officer of ATA), available at <https://docs.house.gov/meetings/PW/PW00/20230201/115263/HRG-118-PW00-Wstate-SpearC-20230201.pdf>.

<sup>68</sup>See William B. Cassidy, *US Truckload Driver Turnover Flattens as wages, demand rise: ATA*, J. OF COMMERCE, (Mar. 30, 2021), available at [https://www.joc.com/article/us-truckload-driver-turnover-flattens-wages-demand-rise-ata\\_20210330.html](https://www.joc.com/article/us-truckload-driver-turnover-flattens-wages-demand-rise-ata_20210330.html) [hereinafter *Cassidy*]; Peter S Goodman and George Etheredge, *The Real Reason America Doesn't Have Enough Truck Drivers*, N.Y. TIMES, (Feb. 9, 2022), available at <https://www.nytimes.com/2022/02/09/business/truck-driver-shortage.html>.

<sup>69</sup>Cassidy, *supra* note 68.

stacles to attracting and retaining qualified drivers.<sup>70</sup> Still, others within the trucking industry view driving automation and the possible quality of life improvement as having the potential to help address the estimated demand for new truck drivers in the long-haul trucking segment.<sup>71</sup>

An additional study released by DOT estimates that Level 4 and Level 5 automation in the long-haul CMV segment would lead to economy-wide productivity improvements.<sup>72</sup> This could see annual earnings for all American workers increase \$203–267 per year, and increase total United States employment by 26,400 to 35,100 jobs per year, even while taking into account expected job losses in the long-haul sector.<sup>73</sup> The report concludes that long-haul drivers will move into short-haul jobs.<sup>74</sup> However, a University of Michigan and Carnegie Mellon University study assumes that increases in short haul-operations will not compensate for losses in long haul-operator hours.<sup>75</sup> Nonetheless, AV technology companies project that many long-haul drivers would be employed in new jobs created by the industry with a higher quality of life, such as remote driving assistants, even as it remains likely that most truck drivers entering the market today will retire as truck drivers.<sup>76</sup>

#### FUEL COSTS—

Fuel costs are the second highest cost category for the trucking industry.<sup>77</sup> AVs may reduce the amount of fuel required, thereby significantly reducing fuel costs and benefitting the environment.<sup>78</sup> Truck platooning, which uses automation to allow trucks to follow each other at a set distance between trucks, allows trucks to travel closer together and offers potential improvements in overall fuel economy.<sup>79</sup> A study shows that platooning with automated trucks can reduce fuel consumption by 10 to 25 percent and reduce emissions.<sup>80</sup>

### VIII. MAINTAINING AMERICAN LEADERSHIP

The United States Federal Government has remained committed to policies that will enable America to lead the world in both AV technology development and the safe integration of these systems into the Nation's transportation network.<sup>81</sup> However, the Chinese Communist Party (CCP) has aggressively moved to become the world leader in the deployment of emerging technologies, by directing both human capital and government resources to this goal.<sup>82</sup> For example, in 2020, China's National Development and Reform Commission, the Ministry of Industry and Information Technology (MIIT), and 11 other ministries and commissions jointly issued a strategy for the innovative development of autonomous vehicles.<sup>83</sup> In 2021, the National People's Congress passed an initiative to invest and consolidate resources for

<sup>70</sup> *Under Pressure: The State of Trucking in America: Hearing Before the H. Comm. on Transp. and Infrastructure*, 116th Cong. (2019) (Testimony of Todd Spencer, Owner-Operator Indep. Drivers Assoc.), available at <https://docs.house.gov/meetings/PW/PW12/20190612/109600/HHRG-116-PW12-Wstate-SpencerT-20190612.pdf>.

<sup>71</sup> Automated Vehicles 3.0, *supra* note 65.

<sup>72</sup> ROBERT WASCHIK, ET. AL, DOT, BUREAU OF TRANSP. STAT., MACROECONOMIC IMPACTS OF AUTOMATED DRIVING SYSTEMS IN LONG-HAUL TRUCKING, (Jan. 28, 2021), available at <https://rosap.nhtl.bts.gov/view/dot/54596>.

<sup>73</sup> *Id.*

<sup>74</sup> *Id.*

<sup>75</sup> Aniruddh Mohan and Parth Vaishnav, *Impact of Automation on Long Haul Trucking Operator-hours in the United States*, HUMANITIES & SOCIAL SCIENCES COMMUNICATIONS, (Mar. 15, 2022), available at <https://www.nature.com/articles/s41599-022-01103-w#:~:text=Starting%20with%20only%20a%2010,haul%20operator%2Dhours%20at%20risk>.

<sup>76</sup> Cristina Commendatore, *Self-Driving Technology Won't Endanger Truck Driver's Role, Developers Say*, FLEET OWNER, (Dec. 8, 2021), available at <https://www.fleetowner.com/technology/autonomous-vehicles/article/21183187/selfdriving-technology-wont-endanger-truck-drivers-role-developers-say>.

<sup>77</sup> Automated Vehicles 3.0, *supra* note 65.

<sup>78</sup> *Id.*

<sup>79</sup> *Id.*

<sup>80</sup> Peter Buxbaum, *Vehicle Automation and Carbon Emissions*, GLOBAL TRADE, (Dec. 22, 2016), available at <https://www.globaltrademag.com/vehicle-automation-carbon-emissions/>.

<sup>81</sup> Automated Vehicles 3.0, *supra* note 65.

<sup>82</sup> KLYNNELD PEAT MARWICK GOERDELER, LEVELLING UP: CHINA'S RACE TO AN AUTONOMOUS FUTURE, (2022), available at <https://assets.kpmg.com/content/dam/kpmg/cn/pdf/en/2022/06/special-report-on-autonomous-driving.pdf>.

<sup>83</sup> *From Sci-fi to Reality: Autonomous Driving in China*, MCKINSEY & COMPANY, (Jan. 3, 2023), available at <https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/from-sci-fi-to-reality-autonomous-driving-in-china>.

scientific and technological laboratories with a focus on researching and developing emerging technologies, including applications like autonomous vehicles.<sup>84</sup>

Federal lawmakers, on a bipartisan basis, have raised concerns that the CCP has past restrictions on American AV companies operating or testing in China, while at the same time Chinese companies are allowed to test in the United States.<sup>85</sup> This concern was recently echoed by United States Secretary of Transportation Pete Buttigieg.<sup>86</sup> Committee Members may be concerned about the potential for American technology to be transferred to the CCP. For example, TuSimple, an autonomous trucking company, has been under investigation by the Committee on Foreign Investment in the United States (CFIUS) over concerns that technology has been improperly transferred to China.<sup>87</sup> It has been reported that the company intends to divest from the American market.<sup>88</sup> Many of the same technologies used to develop autonomous cars may also be used for autonomous trucks. For example, Pony.ai, which is testing autonomous cars in California and Arizona, has aggressively moved into the AV truck segment in China, through a joint venture with Sinotrans and Sany Heavy Truck.<sup>89</sup> Sinotrans is a Chinese State-Owned Enterprise.<sup>90</sup>

#### IX. WITNESSES

- Mr. Chris Urmson, Co-Founder & Chief Executive Officer, Aurora Innovations, Inc.
- Mr. Jeff Farrah, Executive Director, Autonomous Vehicle Industry Association
- Mr. Chris Spear, President and Chief Executive Officer, American Trucking Associations
- Ms. Cathy Chase, President, Advocates for Highway and Auto Safety

<sup>84</sup> Ben Murphy, *Translation: Outline of the People's Republic of China 14th Five-Year Plan for National Economic and Social Development and Long-Range Objectives for 2035*, CTR. FOR SEC. & EMERGING TECH., (May 12, 2021), available at [https://cset.georgetown.edu/wp-content/uploads/t0284\\_14th\\_Five\\_Year\\_Plan\\_EN.pdf](https://cset.georgetown.edu/wp-content/uploads/t0284_14th_Five_Year_Plan_EN.pdf).

<sup>85</sup> See Letter from Tim Walberg, et. al. to Gina M. Raimondo, Sec'y of United States Dep't of Commerce & Pete Buttigieg, Sec'y of United States DOT, (Jul. 17, 2023), available at <https://walberg.house.gov/sites/evo-subsites/walberg.house.gov/files/evo-media-document/letter-to-dot-and-doc-chinese-av-testing-07.17.23.pdf>; Jordyn Grzelewski, *U.S. House China Committee Members Talk Supply Chains With Detroit Auto Execs*, THE DETROIT NEWS, (Jun. 20, 2023), available at <https://www.detroitnews.com/story/business/autos/2023/06/20/house-china-panel-members-meet-detroit-auto-exec-on-supply-chains/70335754007/>.

<sup>86</sup> Dashveenjit Kaur, *Chinese Autonomous Vehicles in the United States May Soon be Under Scrutiny*, TECH WIRE ASIA, (Jul. 21, 2023), available at <https://techwireasia.com/2023/07/chinese-autonomous-vehicles-in-the-us-may-soon-be-under-scrutiny-heres-why/>.

<sup>87</sup> Kate O'Keefe, et. al., *Leaders of Self-Driving-Truck Company Face Espionage Concerns Over China Ties*, WALL ST. J., (Feb. 1, 2023), available at <https://www.wsj.com/articles/leaders-of-self-driving-truck-company-face-espionage-concerns-over-china-ties-11675255921>.

<sup>88</sup> Alan Ohnsman, *Exclusive: Troubled Robot Truckmaker TuSimple Says It May Sell Off United States Business*, FORBES, (Jun. 28, 2023), available at <https://www.forbes.com/sites/alanohnsman/2023/06/28/troubled-robot-truckmaker-tusimple-says-it-may-sell-off-us-business/?sh=e64c16764e04>.

<sup>89</sup> Fan Feifei, *Self-driving Trucks Poised to Overhaul Long-haul Logistics*, CHINA DAILY, (Jan. 4, 2023), available at <https://www.chinadaily.com.cn/a/202301/04/WS63b4d91ca31057c47eba7957.html>.

<sup>90</sup> Zhong Nan, *Sinotrans to focus on logistics after being acquired by China Merchants*, CHINA DAILY, (March 16, 2016), available at [https://www.chinadaily.com.cn/business/2016-03/16/content\\_23887666.htm](https://www.chinadaily.com.cn/business/2016-03/16/content_23887666.htm).





**THE FUTURE OF AUTOMATED COMMERCIAL  
MOTOR VEHICLES: IMPACTS ON SOCIETY,  
THE SUPPLY CHAIN, AND U.S. ECONOMIC  
LEADERSHIP**

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**WEDNESDAY, SEPTEMBER 13, 2023**

HOUSE OF REPRESENTATIVES,  
SUBCOMMITTEE ON HIGHWAYS AND TRANSIT,  
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,  
*Washington, DC.*

The subcommittee met, pursuant to call, at 9:59 a.m., in room 2167 Rayburn House Office Building, Hon. Eric A. “Rick” Crawford (Chairman of the subcommittee) presiding.

Mr. CRAWFORD. The Subcommittee on Highways and Transit will come to order.

I ask unanimous consent that the chairman be authorized to declare a recess at any time during today’s hearing.

Without objection, so ordered.

I also ask unanimous consent that Members not on the subcommittee be permitted to sit with the subcommittee today at this hearing and ask questions.

Without objection, so ordered.

As a reminder, if Members wish to insert a document into the record, please also email it to DocumentsTI@mail.house.gov.

I now recognize myself for the purposes of an opening statement for 5 minutes.

**OPENING STATEMENT OF HON. ERIC A. “RICK” CRAWFORD OF  
ARKANSAS, CHAIRMAN, SUBCOMMITTEE ON HIGHWAYS AND  
TRANSIT**

Mr. CRAWFORD. Good morning, and thank you to our witnesses for being here for today’s hearing.

Much of the Transportation and Infrastructure Committee’s activities this year have focused on efforts to address the Nation’s supply chain crisis, and rightly so.

The pandemic exposed the fragility of our supply chain. Labor shortages and shutdowns—most notably of cities, factories, and manufacturing hubs in China—as well as demand changes, decimated our logistics system and economy. The administration has only pushed policies that have led to historic levels of inflation and sky-high gas prices, further exacerbating the supply chain problem and pain in our pocketbooks.

As part of our efforts, we have received testimony and considered proposals to strengthen our supply chain, in part by addressing the

unprecedented challenges facing our Nation's trucking industry and truckdrivers. This subcommittee understands that truckdrivers are critical to our supply chain and economy as a whole. They provide the necessary connectivity between different modes of transportation, such as ships, trains, and planes.

Over 8.7 million commercial motor vehicle drivers operate in the United States, traveling billions of miles each year, serving every community in our country. In fact, more than 70 percent of our Nation's freight tonnage is moved by the trucking industry every year, and more than 80 percent of our communities get their goods exclusively by truck—despite the fact that we have an estimated shortage of 78,000 truckdrivers today.

Workforce needs are only expected to continue to be a challenge. It's estimated 1.2 million new drivers will need to be recruited over the next decade to keep pace with growing demand and an aging workforce.

Therefore, it is fitting that we are holding this hearing in the middle of National Truck Driver Appreciation Week, as we celebrate these valued professionals who work every day to deliver products to every community in the country.

During our hearing today, we will explore the benefits realized from the deployment of automated commercial motor vehicles, or CMVs.

First, autonomous trucks can increase safety on our Nation's roadways and save lives. The National Highway Traffic Safety Administration estimates that 42,795 people died in all motor vehicle accidents in 2022.

Despite the great progress we have made over the years incorporating safety features in all vehicles and infrastructure, strengthening traffic safety laws and reinforcing them with public and driver education, and improving healthcare outcomes, traffic fatalities have not fallen below 2014's rate of 1.08 per 100 million vehicle-miles traveled.

The good news is that we know the major source of these crashes—a whopping 94 percent of serious crashes—are due to driver factors, such as speeding or driving while fatigued, impaired, or distracted.

AV trucks, like AV cars, help us with anticipating road dangers and mitigating and removing human error from the chain of events that lead to a crash, thereby reducing the number of accidents caused by human error.

In addition, autonomous trucks can strengthen our supply chain. Arkansas' own Tyson Foods just announced last week that it is partnering with Gatik AI in a multiyear collaboration to deploy refrigerated boxtrucks in northwest Arkansas to support fast product movement, ensure supply chain continuity, and guard against continued workforce shortages.

AV trucks can increase the efficiency and productivity of logistics and transportation operations and enable route optimization, which in turn would reduce delivery times. They can improve fleet utilization and efficiencies. Productivity and operations savings result in lower fleet rates that could be passed on to consumers and provide solutions to supply chain bottlenecks.

Autonomous trucks also can help address environmental concerns and improve air quality. Roadway capacity increases, less congestion, and fewer crashes would result in reduced fuel consumption and lower emissions.

In addition, this can improve the quality of life for truckdrivers, as it makes driving a big rig less stressful, more enjoyable, and safer. The improvement in a driver's quality of life will help attract new employees to join the industry, which is desperately needed.

AV deployment will also create new, high-paying jobs in the trucking industry. We need to incorporate employee development and training programs to upskill our workforce so that they can take advantage of new jobs that AVs will create. And while I remain confident about the potential for this technology, I am also confident that if you choose to become a truckdriver today, you will have the ability to retire as a truckdriver.

While there are many autonomous trucks operating with safety drivers on the road today in certain parts of the country, there is still a long way to go before we reach full commercial deployment.

There are also some issues that need to be considered as this expensive technology is safely integrated into existing fleets. For example, we need to discuss if any rules and regulations at the Federal level need to change to reflect that a driver may not always be in the cab, such as how trucks can continue to be safely inspected.

While many have called for a Federal regulatory framework, such a framework should not be overly prescriptive, but instead create guardrails for the industry to grow with safety at the forefront. We must avoid stifling innovation as the technology develops, and striking this balance is vital for America to continue its global competitive edge in this industry.

Make no mistake, the Chinese Communist Party, the biggest geopolitical threat our country faces, is moving aggressively into this space. The CCP will scheme to use the power of their state-owned enterprises to undercut American businesses and manipulate the market.

I look forward to hearing from today's panel of stakeholders, who offer a unique perspective on the benefits of autonomous trucks and how AV truck technology is developed, brought to market, and safely incorporated into existing transportation companies and networks.

[Mr. Crawford's prepared statement follows:]

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**Prepared Statement of Hon. Eric A. "Rick" Crawford, a Representative in Congress from the State of Arkansas, and Chairman, Subcommittee on Highways and Transit**

Much of the Transportation and Infrastructure (T&I) Committee's activities this year have focused on efforts to address the Nation's supply chain crisis, and rightly so.

The pandemic exposed the fragility of our supply chain. Labor shortages and shutdowns—most notably of cities, factories, and manufacturing hubs in China—as well as demand changes, decimated our logistics system and economy. And the Administration has only pushed policies that have led to historic levels of inflation and sky-high gas prices, further exacerbating the supply chain problem and pain in our pocketbooks.

As part of our efforts, we have received testimony and considered proposals to strengthen our supply chain, in part by addressing the unprecedented challenges facing our Nation's trucking industry and truck drivers. This subcommittee understands that truck drivers are critical to our supply chain and economy as a whole. They provide the necessary connectivity between different modes of transportation, such as ships, trains, and planes.

Over 8.7 million commercial motor vehicle drivers operate in the United States, traveling billions of miles each year, serving every community in our country. In fact, more than 70 percent of our Nation's freight tonnage is moved by the trucking industry every year, and more than 80 percent of our communities get their goods exclusively by trucks—despite the fact that we have an estimated shortage of 78,000 truck drivers today.

Workforce needs are only expected to continue to be a challenge—it's estimated 1.2 million new drivers will need to be recruited over the next decade to keep pace with growing demand and an aging workforce.

Therefore, it is fitting that we are holding this hearing in the middle of National Truck Driver Appreciation Week, as we celebrate these valued professionals who work, every day, to deliver products to every community in the country. During our hearing today, we will explore the benefits realized from the deployment of automated commercial motor vehicles (CMVs).

First, autonomous trucks can increase safety on our Nation's roadways and save lives. The National Highway Traffic Safety Administration (NHTSA) estimates that 42,795 people died in all motor vehicle accidents in 2022.

Despite the great progress we have made over the years incorporating safety features in all vehicles and infrastructure, strengthening traffic safety laws and reinforcing them with public and driver education, and improving health care outcomes, traffic fatalities have not fallen below 2014's rate of 1.08 per 100 million vehicle miles travelled.

The good news is that we know the major source of these crashes—a whopping 94 percent of serious crashes—are due to driver factors, such as speeding or driving while fatigued, impaired, or distracted.

Autonomous vehicle (AV) trucks, like AV cars, help us with anticipating road dangers and mitigating or removing human error from the chain of events that lead to a crash, thereby reducing the number of accidents caused by human error. In addition, autonomous trucks can strengthen our supply chain.

Arkansas's own Tyson Foods just announced last week that it's partnering with Gatik AI in a multi-year collaboration to deploy refrigerated box trucks in Northwest Arkansas to support fast product movement, ensure supply chain continuity, and guard against continued workforce shortages.

AV trucks can increase the efficiency and productivity of logistics and transportation operations and enable route optimization, which in turn, would reduce delivery times. They can improve fleet utilization and efficiencies. Productivity and operations savings result in lower fleet rates that could be passed onto consumers and provide solutions to supply chain bottlenecks.

Autonomous trucks also could help address environmental concerns and improve air quality. Roadway capacity increases, less congestion, and fewer crashes would result in reduced fuel consumption and lower emissions.

In addition, this can improve the quality of life for truck drivers, as it makes driving a big rig less stressful, more enjoyable, and safer. The improvement in a driver's quality of life will help attract new employees to join the industry, which is desperately needed.

AV deployment also will create new, high-paying jobs in the trucking industry. We need to incorporate employee development and training programs to upskill our workforce so they can take advantage of new jobs that AVs will create. And while I remain confident about the potential for this technology, I also am confident that if you choose to become a truck driver today, you will have the ability to retire as a truck driver.

While there are many autonomous trucks operating with safety drivers on the road today in certain parts of the country, there is still a long way to go before we reach full commercial deployment.

There are also some issues that need to be considered as this expensive technology is safely integrated into existing fleets. For example, we need to discuss if any rules and regulations at the federal level need to change to reflect that a driver may not always be in the cab, such as how trucks can continue to be safely inspected.

While many have called for a federal regulatory framework, such a framework should not be overly prescriptive, but instead create guardrails for the industry to grow with safety at the forefront. We must avoid stifling innovation as the tech-

nology develops, and striking this balance is vital for America to continue its global competitive edge in this industry.

Make no mistake, the Chinese Communist Party (CCP), the biggest geopolitical threat our country faces, is moving aggressively into this space. The CCP will scheme to use the power of their State-Owned Enterprises to undercut American businesses and manipulate the market.

I look forward to hearing from today's panel of stakeholders, who offer a unique perspective on the benefits of autonomous trucks, and how AV truck technology is developed, brought to market, and safely incorporated into existing transportation companies and networks.

Mr. CRAWFORD. I now yield back and recognize Ranking Member Norton for 5 minutes for an opening statement.

**OPENING STATEMENT OF HON. ELEANOR HOLMES NORTON  
OF THE DISTRICT OF COLUMBIA, RANKING MEMBER, SUB-  
COMMITTEE ON HIGHWAYS AND TRANSIT**

Ms. NORTON. I want to thank subcommittee Chair Rick Crawford for holding this hearing on autonomous vehicles.

Today, I am interested in discussing the effects of autonomous vehicles on roadway safety and the commercial driving workforce. This committee has a responsibility to ensure that as autonomous vehicles are deployed, the highest possible safety standards are met and that Americans have access to high-quality, family-wage transportation jobs.

Automated vehicles, including commercial trucks and transit buses, are already on the road in many jurisdictions across the country and have the potential of transforming our transportation system. We must thoughtfully address the emerging opportunities and risks.

Nationwide, we are experiencing a startling rise in roadway fatalities. Autonomous vehicles have the potential to save lives by reducing traffic crashes caused by human behavior, but that potential is not a guarantee. Potential safety benefits must be carefully weighed against risks, especially when public roads are being used as testing grounds for new technologies. The bottom line cannot be saving money—it must be saving lives.

To that end, Congress and the Department of Transportation must ensure that autonomous vehicle deployments are only permitted in a manner that prioritizes the safety of the traveling public, including vulnerable road users like pedestrians and cyclists.

Autonomous vehicles must also be integrated into our transportation system in a way that respects America's commercial driving workforce. Autonomous vehicles could significantly improve working conditions for commercial drivers and increase on-the-job safety. But eliminating the need for a human driver could also result in widespread job displacement if the needs of workers are not prioritized at the outset.

Commercial truck driving is a proven career path that offers a wage that can support a family. These jobs do not require a college degree. They are an opportunity for people to achieve high earnings without going into debt.

Comprehensive regulations and oversight of autonomous vehicle deployment will be required to create and preserve high-quality, family-wage jobs and good working conditions for Americans whose livelihoods depend on driving.

Thank you to each of our witnesses for being here today and offering your unique insights. I look forward to the discussion.  
[Ms. Norton's prepared statement follows:]

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**Prepared Statement of Hon. Eleanor Holmes Norton, a Delegate in Congress from the District of Columbia, and Ranking Member, Subcommittee on Highways and Transit**

I would like to thank Subcommittee Chair Rick Crawford for holding this hearing on autonomous vehicles.

Today, I am interested in discussing the effects of autonomous vehicles on roadway safety and the commercial driving workforce. This Committee has a responsibility to ensure that, as autonomous vehicles are deployed, the highest possible safety standards are met and that Americans have access to high-quality, family-wage transportation jobs.

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Comprehensive regulations and oversight of autonomous vehicle deployment will be required to create and preserve high-quality, family-wage jobs and good working conditions for Americans whose livelihoods depend on driving.

Thank you to each of our witnesses for being here today and offering your unique insights. I look forward to the discussion.

Mr. CRAWFORD. Thank you, Ranking Member.

I now recognize the ranking member of the full committee for any comments he would like to make.

**OPENING STATEMENT OF HON. RICK LARSEN OF WASHINGTON, RANKING MEMBER, COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE**

Mr. LARSEN OF WASHINGTON. Thank you, Chair, and Ranking Member, as well, for holding this hearing. It is an opportunity today for Members to learn about the state of the automated commercial motor vehicle industry—what is happening now, what we might see in the future, and how these technological changes will impact public safety, jobs, and the movement of goods.

The Transportation and Infrastructure Committee regularly discusses the impacts of automation across many modes and in different contexts. Autonomous commercial vehicles, or AVs, however, are in a league of their own in terms of potential impact. Consider-

ation of policies surrounding this technology deserves a high degree of scrutiny for several reasons:

- The size and reach of this industry: Trucks move over 70 percent of the Nation's freight by weight, and there are 13.8 million large trucks registered in the U.S.;
- The size of the workforce: In 2022, the industry employed 3.5 million truckdrivers;
- The interface with travelers and communities: Every mile and every hour of a truck's operation is on shared public roads used by families, including highways, rural roads, and neighborhood streets; and
- The safety realities of the industry: Every year currently, over 5,000 people are killed in crashes involving large trucks on our roads.

So, let's start with safety.

In 2021, 5,788 people were killed in crashes involving large trucks. Nondrivers are particularly vulnerable in roadway crashes: Pedestrian fatalities have reached a 41-year high, and bicyclist fatalities have reached a 46-year high.

So, I look forward to hearing from our witnesses today about the safety implications of AVs. While these vehicles hold the promise of reducing driver errors, like distraction or driving under the influence, they also raise different and new safety questions.

How will AVs make split-second decisions on the roadway?

Will they be able to recognize and avoid vulnerable road users? I should say, will the people who program and develop AVs be able to program and develop them to ensure that the trucks recognize and avoid vulnerable road users?

Can they interact safely with emergency vehicles like police cruisers or firetrucks?

These outcomes will have life-or-death implications.

So, while the status quo on highway fatalities is unacceptable, AVs and the people who deploy and design them must be held to the highest standards as they are developed and deployed. We can't substitute one inadequate system for another.

Let's take a look at jobs.

I talk about transportation as a job creator, including how the Bipartisan Infrastructure Law is projected to create over 700,000 jobs per year.

So, while autonomous trucks may create new or different jobs, with human drivers overseeing or dispatching AVs, their mass deployment stands to eliminate jobs or degrade wages for the existing truckdrivers.

Commercial AVs, as well, are not limited to trucks. Transit bus operators also face job losses or changes if a human driver becomes unnecessary.

AV technology has the potential to make truck driving a better job by helping shift more work to safer, more predictable work in short-haul routes or dispatching. But AVs can also threaten career choices that have long been a path for the middle class and a good paycheck.

So, I encourage our industry witnesses today to work closely with the drivers, including labor and independent owner-operators, to hear their concerns and harness their real-world experience to

make sure the power of this technology builds a safer and cleaner motor carrier industry with better jobs for the women and men who move goods.

Now, let's take a look at the practical impacts.

AVs have the potential to improve mobility and accessibility, but also to worsen congestion and carbon pollution. In a world in which cars and trucks could operate without drivers, it is not hard to imagine that gridlock and pollution could come alongside a nascent technology. Unlike a smartphone, this isn't a case where we can put our technology out there and work out the kinks as we go along.

There are also implications for infrastructure. Roadway conditions vary road by road, State by State, and day by day with changing weather.

The technology and those people who develop it need to ensure consistency and uniformity to perform as expected regardless of everyday conditions. As AVs deploy, we may learn quickly the required changes to signage, lane striping, or even roadway design that are needed for them to perform optimally, all requiring infrastructure improvements.

This is an issue of particular importance to this committee and a key question that will need answers as we look to the next round in the future of investment in the revitalization of our roads, bridges, and highways.

So, there are a lot of questions. Some of them are probably perfectly easily answerable, some probably not.

I look forward to hearing about the state of the industry today and learning more from our witnesses about how to best approach these opportunities and, importantly for this committee, these challenges.

With that, I yield back.

[Mr. Larsen of Washington's prepared statement follows:]

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**Prepared Statement of Hon. Rick Larsen, a Representative in Congress from the State of Washington, and Ranking Member, Committee on Transportation and Infrastructure**

Thank you, Chair Crawford and Ranking Member Norton, for holding this hearing.

Today's hearing is an opportunity for Members to learn more about the state of the automated commercial motor vehicle industry—what's happening now, what we might see in the future, and how these technological changes will impact public safety, jobs and the movement of goods.

The T&I Committee regularly discusses the impacts of automation across many modes and in different contexts.

Autonomous commercial vehicles (AVs), however, are in a league of their own in terms of potential impact. Consideration of policy surrounding this technology deserves a high degree of scrutiny for several reasons:

- The size and reach of this industry: trucks move over 70 percent of the nation's freight by weight, and there are 13.8 million large trucks registered in the U.S.;
- The size of the workforce: in 2022, the industry employed 3.5 million truck drivers;
- The interface with travelers and communities: every mile and every hour of a truck's operation is on shared public roads used by families including highways, rural roads, and neighborhood streets; and
- The safety realities of this industry: every year currently over 5,000 people are killed in crashes involving large trucks on our roads.



Let's start with safety first. In 2021, 5,788 people were killed in crashes involving large trucks.

Non-drivers are particularly vulnerable in roadway crashes—pedestrian fatalities have reached a 41-year high, and bicyclist fatalities have a 46-year high.

I look forward to hearing from our witnesses today about the safety implications of AVs. While these vehicles hold the promise of reducing driver errors, like distraction or driving under the influence, they also raise different and new safety questions.

How will AVs make split-second decisions on the roadway? Will they be able to recognize and avoid vulnerable road users? Will the people who program and develop AVs be able to program and develop them to ensure that trucks recognize and avoid vulnerable road users? Can they interact safely with emergency vehicles like police cruisers or fire trucks? These outcomes will have life-or-death implications.

While the status quo on highway fatalities is unacceptable, AVs must be held to the highest safety standards as they are developed and deployed. We can't substitute one inadequate system for another.

Next let's look at jobs. I often talk about transportation as a job-creator, including how the Bipartisan Infrastructure Law (BIL) is projected to create over 700,000 jobs per year.

While autonomous trucks may create new or different jobs, with human drivers overseeing or dispatching AVs, their mass deployment stands to eliminate jobs or degrade wages for the existing truck drivers.

Commercial AVs are not limited to trucks. Transit bus operators also face job losses or changes if a human driver becomes unnecessary.

AV technology has the potential to make truck driving a better job by helping shift more work to safer, more predictable jobs in short-haul routes or dispatching.

But AVs can also threaten a career choice that has long been a path to the middle class and a good paycheck.

I encourage our industry witnesses to work closely with truck drivers, including labor and independent owner-operators, to hear their concerns and harness their real-world experience to make sure the power of this technology builds a safer, cleaner motor carrier industry with better jobs for the women and men who move goods.

Finally, let's look at the practical impacts. AVs have the potential to improve mobility and accessibility.

But they could also worsen congestion and carbon pollution. In a world in which cars and trucks could operate without drivers, it is not hard to imagine that gridlock and pollution could come alongside a nascent technology. Unlike a smartphone, this isn't a case where we can put technology out there and work out the kinks as we go along.

There are also implications for our infrastructure. Roadway conditions vary road by road, state by state, and day by day with the changing weather.

Technology and those who develop it need to ensure consistency and uniformity to perform as expected regardless of everyday conditions. As AVs deploy, we may learn quickly the required changes to signage, lane striping, or even roadway design that are needed for them to perform optimally.

This is an issue of particular importance to this Committee, and a key question that will need answers as we look to the next round of investment in the revitalization of our roads and bridges.

A lot of questions, some of them are probably easily answerable, some probably not.

I look forward to hearing more about the state of the industry today and learning from our witnesses about how to best approach these opportunities and challenges.

Mr. CRAWFORD. I thank the ranking member.

I would now like to welcome our witnesses and thank them for being here today.

Chris Urmson is the cofounder and chief executive officer of Aurora, a company founded in Pittsburgh, Pennsylvania, that is working to commercialize autonomous trucks.

Jeff Farrah is the first executive director of the Autonomous Vehicle Industry Association, which represents both automotive and trucking industry interests.

And we have two witnesses who can speak to how this technology was safely integrated into our transportation network. Chris

Spear is the president and CEO of the American Trucking Associations, along with Cathy Chase, who is the president of Advocates for Highway and Auto Safety.

Thank you all for being here.

Briefly, let me take a minute to explain how our lighting system works for our witnesses.

There are three lights in front of you. Green means go. But unlike a stoplight, yellow does not necessarily mean proceed with caution, as you might expect. In fact, it means go like heck because it is fixing to turn red.

And that means it is time to conclude your remarks. If you don't conclude your remarks at that time, you may hear a little something like this—

[Gavel banging.]

Mr. CRAWFORD [continuing]. Just as a reminder that the light has, in fact, turned red.

I ask unanimous consent that the witnesses' full statements be included in the record.

Without objection, so ordered.

As your written testimony has been made part of the record, the subcommittee asks that you limit your oral remarks to 5 minutes.

With that, Mr. Urmson, you are recognized for 5 minutes for your testimony.

**TESTIMONY OF CHRIS URMSON, COFOUNDER AND CHIEF EXECUTIVE OFFICER, AURORA INNOVATION, INC.; JEFF FARRAH, EXECUTIVE DIRECTOR, AUTONOMOUS VEHICLE INDUSTRY ASSOCIATION; CHRIS SPEAR, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN TRUCKING ASSOCIATIONS; AND CATHERINE CHASE, PRESIDENT, ADVOCATES FOR HIGHWAY AND AUTO SAFETY**

**TESTIMONY OF CHRIS URMSON, COFOUNDER AND CHIEF EXECUTIVE OFFICER, AURORA INNOVATION, INC.**

Mr. URMSON. Chairman Graves, Ranking Member Larsen, Chairman Crawford, Ranking Member Holmes Norton, and members of the subcommittee, thank you for the opportunity to testify.

I would also like to take this opportunity to thank the men and women who keep our economy moving by driving trucks today, and in particular, the Aurora vehicle operations team, during National Truck Driver Appreciation Week.

My name is Chris Urmson, and I am the CEO and cofounder of Aurora, an American autonomous vehicle technology company headquartered in Pittsburgh, Pennsylvania.

Thank you for the opportunity to testify this morning and for the subcommittee's interest in learning about and collaborating on this important topic.

Today, I would like to tell you about how safety guides everything we do at Aurora, the jobs we support, and what the future of autonomous trucking looks like from my perspective.

Over my 20-year career, I have worked on solving one of the toughest engineering challenges of our time: enabling vehicles to drive themselves safely. From my time with Carnegie Mellon, then

Google's self-driving car project, and now at Aurora, my passion for improving safety on our roadways has driven my career.

Aurora's mission is to deliver the benefits of self-driving technology safely, quickly, and broadly. We are building the Aurora Driver, which will safely move goods and people through the world. The Aurora Driver is made up of the hardware, the software, and the data services needed to drive vehicles safely.

Since founding Aurora in 2017, I am very proud that we have grown from just our 3 cofounders—Sterling Anderson, Drew Bagnell, and me—into a publicly traded company that employs 1,800 people in 8 cities across 7 States. Together, Aurora's team is an incredible compilation of talents, experience, and expertise.

In addition to investing in the people who work at Aurora with me today, we are trying to do our part in developing the future workforce for the jobs of tomorrow.

For example, Aurora worked with the Pittsburgh Technical College to design an associate degree program that trains and accredits fleet support technicians, giving them the tools they need to maintain autonomous vehicles and support automated vehicle operations.

This complements the work we do with Gallatin College in Bozeman, Montana, where Aurora is investing in new educational programs to train sensor technicians.

As the need for these jobs grows, academic degrees, technical training programs, and apprenticeships will be essential in building the workforce of the future.

Autonomous vehicle technology is not science fiction. It is not hypothetical. In fact, it is already here. Between Dallas and Houston and Fort Worth and El Paso, we are hauling over 50 loads per week for our commercial partners like FedEx, Werner, Hirschbach, Schneider, and Uber Freight.

Today, we have a trained operator with a commercial driver's license behind the wheel and a right-seat operator next to them monitoring the autonomous system as we complete our validation work and safety case.

Hauling customer loads helps us build our technology and support services to seamlessly integrate into our partners' operations.

It is unacceptable that we lose 42,000 Americans on our roads every year. A culture focused on safety is paramount for the success of Aurora and addressing this ongoing tragedy.

In my written testimony, I have included details about Aurora's safety work, from our first-of-its-kind Safety Management System, our Safety Case Framework, and our engagement developing best practices and safety standards that will guide the AV industry. We are working hard to ensure that autonomous vehicles can operate safely.

We are also building a culture and organizational safety program, knowing that we have to build trust, first and foremost, with all stakeholders, from legislators and regulators at all levels of Government, to our customers and the communities where we operate.

Aurora's chief safety officer, Nat Beuse, testified at the autonomous vehicle hearing last February, and I look forward to answering questions about the progress we have made since then toward

completing our safety case. I hope our commitment to transparency and safety is clear as we continue to engage with all of you on these important issues.

You may be wondering what the Government can do to support American automated vehicle technology. I am looking forward to answering your questions you may have about our cab-mounted warning beacon exemption application pending before FMCSA.

Granting the application would be a clear way for the Federal Government to support the safe deployment of all AVs and demonstrate to the world how important improving roadway safety is to the United States.

The basic principles of American innovation and the free flow of capital are why we could build a company with a mission and business model that will benefit America. America must maintain this competitive advantage and continue to invest in automated vehicle technology.

After two decades in the autonomous vehicle industry, I am incredibly excited and motivated by the future in front of us as a country.

I look forward to answering your questions.

Thank you.

[Mr. Urmson's prepared statement follows:]

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**Prepared Statement of Chris Urmson, Cofounder and Chief Executive Officer, Aurora Innovation, Inc.**

Chairman Graves, Ranking Member Larsen, Chairman Crawford, Ranking Member Holmes Norton, and Members of the Subcommittee on Highways and Transit. Thank you for the invitation to provide testimony for the hearing "The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership."

My name is Chris Urmson and I am the CEO and Co-founder of Aurora. I have twenty years of experience leading automated vehicle programs, which started when I was the Director of Technology for Carnegie Mellon's DARPA Grand and Urban Challenge Teams in Pittsburgh, Pennsylvania. After the DARPA Challenges, my family and I moved to California where I helped found and lead Google's self-driving car program (now Waymo). In early 2017, I co-founded Aurora with Sterling Anderson and Drew Bagnell.<sup>1</sup> I have been issued over 150 patents and have authored over 50 publications. I earned a PhD in Robotics from Carnegie Mellon University and a Bachelor of Science in Computer Engineering from the University of Manitoba.

As we celebrate National Truck Driver Appreciation Week, we recognize the essential role truck drivers play in today's supply chain and we are excited about the opportunity to showcase our vehicle operators' excitement and enthusiasm for autonomous vehicles (AVs) and their impact on our communities, and future generations to come.<sup>2</sup> I'd like to take this opportunity to thank all truck drivers for their dedication, commitment, and the many challenges they overcome to ensure that our goods are delivered safely, securely, and on time.

ABOUT AURORA

Aurora is a publicly-traded American company with the mission to deliver the benefits of self-driving technology safely, quickly, and broadly. We are building the Aurora Driver: a platform that brings together software, hardware, and data services, to autonomously operate any vehicle without the need for a human operator in the vehicle. Aurora has offices across 8 cities in 7 states, including our headquarters in Pittsburgh, Pennsylvania, and employs 1,800 people ranging from hardware and software engineers to commercial drivers and operations specialists.

<sup>1</sup> <https://ir.aurora.tech/company-information/leadership-team>

<sup>2</sup> Future of Freight: Leveraging Industry Expertise to Safely Deploy Autonomous Trucks, [https://www.youtube.com/watch?v=8lj\\_QljY644](https://www.youtube.com/watch?v=8lj_QljY644)

The Aurora Driver can power a variety of diverse vehicle platforms, from Class 8 trucks to passenger vehicles. The Aurora Driver runs on a robust, proprietary computer that enables powerful software to understand complex environments and safely control the vehicle through them. It incorporates high-resolution radar, lidar, and camera data that allow it to simultaneously see and track objects around the vehicle, giving it deep familiarity with the ever-changing, surrounding world.

Aurora has deep collaborations with truck OEM partners that will be critical to bringing autonomous technology to market. We have strategic partnerships with two of the top three truck OEMs that collectively produce about 50% of the trucks sold in the U.S. market.<sup>3</sup> Aurora has long-term commitments to build and deploy self-driving trucks at scale with these partners, and all parties are making significant investments in the success of the programs—both with capital and with experience and skill.

As Aurora continues to hit milestones<sup>4</sup> and prepare for the commercial launch of our Aurora Horizon<sup>5</sup> autonomous trucking service, we are keeping our industry-leading safety approach at the forefront of development and deployment. Because the focus of this hearing is commercial trucking, my written comments are focused on Aurora’s activities and efforts around heavy duty trucks.

#### THE IMPORTANCE OF AUTONOMOUS TRUCKING

The United States lost over 42,000 Americans on our roads last year.<sup>6</sup> Two million Americans are injured in vehicle crashes each year which puts strain on families, our health care system, law enforcement resources, and the workforce.<sup>7</sup> We believe that the public and private sectors should be using every tool in the toolbox to address this public health crisis.

Specific to trucking, there are approximately 500,000 truck crashes each year and the U.S. saw approximately 5,800 fatalities in large truck accidents in 2021, a 17% year-over-year increase.<sup>8</sup> In the U.S., trucking accounts for 195 billion vehicle miles traveled (VMT) annually, is 65 percent of total goods movement,<sup>9</sup> and is a \$700 billion segment of the U.S. economy.<sup>10</sup>

Innovation is imperative for the continued health of the trucking industry and for the U.S. to remain globally competitive. Autonomous trucks will help support manufacturers and retailers with the safe movement of goods. We expect AVs to dramatically reduce the rate of crashes and injuries on our roadways over the long term, which in turn will reduce pressure on local emergency responders and health care systems. The tremendous potential benefits of autonomous technology are apparent to many in the supply chain. For example, in California, we’re seeing a diverse group of stakeholders—from former law enforcement officers and safety organizations to small business owners, suppliers, and manufacturers—all supporting the continued development of this technology at recent public hearings.

<sup>3</sup> [https://dl1o3yog0oux5.cloudfront.net/\\_cb99f486f1d34eb2c6df028273f8ba29/aurora/db/856/7880/pdf/Investor+Presentation++August+2023.pdf](https://dl1o3yog0oux5.cloudfront.net/_cb99f486f1d34eb2c6df028273f8ba29/aurora/db/856/7880/pdf/Investor+Presentation++August+2023.pdf)

<sup>4</sup> <https://blog.aurora.tech/products/the-aurora-driver-is-feature-complete>

<sup>5</sup> <https://aurora.tech/aurora-horizon>

<sup>6</sup> 1.3 million people die per year in road fatalities (WHO 2022); <https://www.nhtsa.gov/press-releases/traffic-crash-death-estimates-2022>.

<sup>7</sup> <https://www.google.com/url?q=https://www.cdc.gov/vitalsigns/motor-vehicle-safety/index.html%23%3DHowever%252C%2520more%2520than%252032%252C000%2520people%2520from%2520motor%2520vehicle%2520crashes&sa=D&source=docs&ust=1694382628750727&usg=AOvVaw0bjxQBNSVPvutJwCDFQBVD>

<sup>8</sup> National Highway Traffic Safety Administration (NHTSA) “Traffic Safety Facts: Large Trucks” Revised June 2023

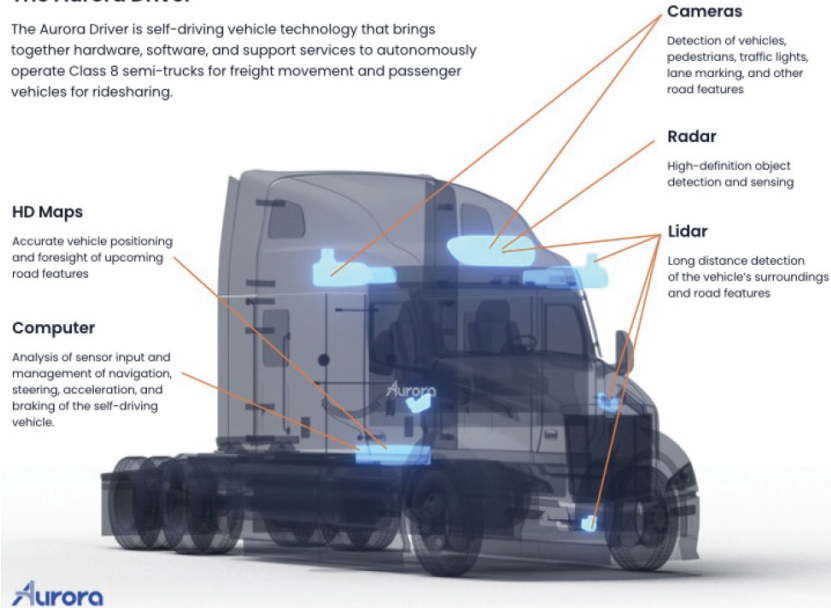
<sup>9</sup> Trucking accounts for 300B miles annually (BTS 2020) and moved 65% of goods by weight in 2017 (BTS 2017)

<sup>10</sup> A.T. Kearney State of Logistics, 2020.

## THE AURORA DRIVER

**The Aurora Driver**

The Aurora Driver is self-driving vehicle technology that brings together hardware, software, and support services to autonomously operate Class 8 semi-trucks for freight movement and passenger vehicles for ridesharing.



Aurora uses sensor fusion from a combination of lidar, radar, and cameras to give the Aurora Driver a near 360° view of its environment. This fusion of different sensor types allows the Aurora Driver to leverage the best of what each sensor can provide, allowing the technology to see at long ranges and in poor weather conditions. At the heart of this sensor technology is our industry-leading proprietary FirstLight lidar, which is able to track and detect objects greater than 400 meters away while simultaneously measuring their speed. Seeing and being able to nearly simultaneously interpret what those actors are doing at this distance allows for quicker reaction time and safer motion planning, which is critical when moving at highway speeds. We collect and use sensor data from our vehicles to build our maps, train our system, and continuously improve our technology.

## AURORA'S INVESTMENT IN PARTNERSHIPS

We are continuing to build a powerful ecosystem of the world's leading trucking, automotive, and logistics companies to bring the promise of autonomous trucking to market. Our work with our truck OEM partners, PACCAR and Volvo Trucks, and our new Hardware as a Service partner, Continental, continues to progress as we prepare for Commercial Launch and beyond.

In order to operate at scale our technology needs to withstand challenging durability requirements while installed on a truck. For example, during the second quarter of 2023, PACCAR completed a 1.5 million equivalent mile durability test of a Kenworth cab with the Aurora Driver hardware installed. The Aurora Driver hardware remained fully functional at the end of the test.

Volvo Autonomous Solutions and Aurora expect to begin testing an autonomy-enabled prototype Volvo truck powered by the Aurora Driver in the first quarter of 2024. Separately, Volvo Autonomous Solutions has expanded its footprint in North America with the establishment of an office in Texas and started manual operations in preparation for the commercial launch of its autonomous hub-to-hub transport solution, powered by the Aurora Driver.

In April, we announced a long-term partnership with Continental to develop, manufacture, and service a commercially-scalable future generation of the Aurora Driver's hardware kit. Continental has already started development efforts to scale the Aurora Driver. In addition, the partnership's Hardware as a Service structure will enable Aurora to pay for the hardware on a per mile basis. This structure is

a first-of-its-kind for this industry and aligns with and supports our Driver as a Service business model.

The model also drives significant value-alignment between, Continental, our customers, and ourselves. We believe industrializing our hardware kit through this partnership will help us achieve the commercial scale and cost structure necessary to support our long-term profitability objectives.

#### AURORA'S COMMITMENT TO SAFETY

Risk is inherent in everything people do. Even the most common, frequent tasks we undertake, from taking a shower to driving around town, have inherent risk. With this in mind, humans have developed means of mitigating those risks—our showers are designed to have anti-slip surfaces and our vehicles have seat belts, airbags, and other safety equipment. While these safety controls do not eliminate the risk entirely, they help ensure the activities we complete every day are acceptably safe—meaning risk is mitigated enough that we can complete everyday activities without posing significant risks to ourselves or those around us.

This applies to developing vehicles as well, autonomous or otherwise. At the end of the day, after we have completed all of our objectives, double- and triple-checked our work, and verified and validated the results, there will always still be some degree of residual risk. When developing the Aurora Driver, we've implemented our Safety Case Framework to show that we're mitigating risk across a wide variety of claims that encompass our product, operations, and organization—enabling partners and customers to know our technology is acceptably safe for public road operations. This work is discussed further below in our learnings from operations on Interstate 45 in Texas.

We take a holistic view of safety, focusing on creating a strong safety culture that permeates every part of our company, including how we do business.<sup>11</sup> A key part of that approach to safety is implementing our Safety Management System, commonly referred to as SMS. This is an organizational approach—employed by safety-critical industries like aviation and rail—that standardizes how safety information moves through a company.

SMS ensures that safety information is presented to the right person, at the right time, and that there is accountability and transparency for every safety action taken across the company. This approach ensures that safety is prioritized as we make decisions, with features such as a Safety Review Board for safety risk management decisions and a clear and easy-to-use Safety Concern Reporting process, both described in detail below.

At Aurora, we are building our SMS on four key components—a detailed Safety Risk Management structure, a robust Safety Assurance program, disciplined Safety Policy documentation, and an engaging Safety Culture that includes safety education and events. Our SMS helps ensure we're proactively identifying safety issues and resolving them as early as possible. It also ensures our entire company values safety, understands our safety procedures, and is using a common language to talk about risk.

We actively work to make safety a part of everyday life at Aurora. For example, our non-retaliation Safety Concern Reporting policy encourages everyone at the company, from our vehicle operators to our C-Suite, to speak up if something doesn't feel safe.



<sup>11</sup> <https://aurora.tech/vssa>

We also leverage experts inside and outside of Aurora. Our Safety Review Board, an internal group of cross-functional leaders, meets regularly to address active safety issues. And we engage regularly with the Aurora Safety Advisory Board, made of external experts from fields including aviation safety, insurance, emergency/trauma medicine, automotive safety, and academia.

Aurora Safety Advisory Board Members:

- Dave Carbaugh, Former Chief Pilot Flight Operations, Boeing
- Adrian Lund, Managing Member of HITCH42, LLC and former President of the Insurance Institute for Highway Safety
- Dr. Victoria Chibuogu Nneji, Lead Engineer & Innovation Strategist at Edge Case Research
- Dr. Jeff Runge, President of Biologue, Inc. and former Administrator of the National Highway Traffic Safety Administration
- George Snyder, President and CEO of GHS Aviation Group
- Karen Rasmussen, Executive Director of the Independent Carrier Safety Association (ICSA)

#### *Safety Case Framework*

How do we know if an AV is safe enough to drive on public roads? It's a question that continues to be asked particularly since this technology has been tested on public roads for almost a decade. At Aurora, our answer is to use a safety case approach to evaluate if our vehicles are acceptably safe to operate on public roads and not create an unreasonable risk to roadway safety.

Safety cases are not a new concept. Our safety case framework is based on the best practices of other industries and on industry standards. They have been widely used in other safety-critical industries like aviation, rail, and medical devices, and have been referenced in AV industry standards, such as UL 4600.

In August 2021, we publicly released Aurora's Safety Case Framework—the first AV Safety Case Framework that applies to both autonomous trucks and passenger vehicles. We believe that a Safety Case Framework is the most effective and efficient path to safely operating without a person onboard the truck and is an imperative component for any company looking to safely deliver commercial-ready AVs at scale. We are the only AV company currently operating in our industry to publicly share its Safety Case Framework and its associated claims.

Building a Safety Case Framework allows us to demonstrate exactly how we are approaching safety and the many factors we are taking into consideration—a stark contrast to simply reporting on miles driven or disengagements, which do not necessarily provide support to demonstrate that a vehicle is safe for any specific context or environment. Our structured approach of defining claims and providing evidence about our technology and operations is the only way Aurora believes we can safely commercialize our AVs.

A structured safety case argument includes a specific claim—e.g., that our self-driving vehicles are acceptably safe to operate on public roads—that is then distributed into multiple levels of subclaims that are supported by evidence. For example, if we make a claim that we can sufficiently maintain and service our self-driving vehicles, then supporting evidence could include our maintenance requirements, procedures, and guidelines and logs.

Along with delivering a safe product, being transparent with our approach is an important part of developing autonomous technology. Our top-level claim, that the Aurora Driver is acceptably safe to operate on public roads, is broken down into the following five safety principles:

- Proficient
- Fail-Safe
- Continuously Improving
- Resilient
- Trustworthy

1. *Proficient*—An AV cannot be considered safe to operate on public roads unless it is suitably proficient. Proficiency includes the design, engineering, testing, and requirements for nominal operations and performance.
2. *Fail-Safe*—The fail-safe principle addresses how the AV behaves in the presence of faults and failures. No system is ever 100% reliable; components will wear out or have premature failures from time to time. This principle ensures that the Aurora Driver safely mitigates these failures.
3. *Continuously Improving*—The continuously improving principle outlines how we are enshrining the concept of continual improvement into the development of our system. Field data feeds a comprehensive data analysis effort that calculates safety performance indicators and also considers data collected during



design and development. Aurora also takes a proactive approach to continuous improvement, using risk identification techniques to proactively identify and manage risks.

4. *Resilient*—AVs are designed to safely operate on public roads, but this does not isolate them from malicious actors or unavoidable events. The resilient principle requires evidence that demonstrates that our system is capable of withstanding adverse events and intentional misuse and abuse. For example, our cyber-security-related claims mostly reside under this principle and are discussed further below.
5. *Trustworthy*—An AV may be claimed to be Proficient, Fail-Safe, Continuously Improving, and Resilient, but without the trust of the public and governmental regulators, it cannot fully realize the top level claim. The trustworthy safety principle addresses how we gain trust through public, government, and stakeholder engagement. We further emphasize safety transparency, safety culture, as well as external review and advisory activities.

## Aurora's self-driving vehicles are acceptably safe to operate on public roads<sup>®</sup>



Aurora will not launch our autonomous trucking product until our safety case for initial driverless operations is complete. We see this as the highest safety bar in our industry, and one that helps ensure our complete product (including software, hardware, and data services) and our company, are ready for commercial operations.

The Aurora Driver will be ready to launch when we have a closed Safety Case for our Dallas to Houston lane. It goes beyond just ensuring the vehicle drives well enough for a demo; rather, it demonstrates that our product, and our company, are holistically and sustainably safe.

### Cyber-security

Securing an AV against cyber-security risks requires diligence throughout its development and operation. A secure system is one that minimizes architectural weaknesses and is ready to respond and recover from identified risks.

Aurora's security architectural approaches are motivated and measured through integration into Aurora's Safety Case. Leaning on the Safety Case and security principals, Aurora has developed an extensive and adaptive security approach, aligned with best practices and standards, to secure the extremely varied component ecosystems that compose an autonomous system. We consider all functional areas of our technology to be potential targets with different threat models, and, therefore, a potential vehicle safety concern.

Aurora has adopted security architectures and risk-based assessment methodologies that derive and measure security controls through two major themes—"Trust the Operation of the Aurora Driver" and "Detect, Respond, and Recover." These two major themes are comprised of six narratives that are addressed cross functionally with our partners and across the company.

- Build, Deploy, and Activate Securely
- Trusted Startup
- Engage Autonomy
- Trusted Off Board Actions

- Identifying privileged access
- Security detection and response

These narratives, and the controls they derive, serve as a blueprint for the components that must be assessed along with the relative depth for each. Inspired by guidance from the National Institute of Standards and Technology (NIST),<sup>12</sup> the National Highway Traffic Safety Administration (NHTSA), and industry groups, this approach enables Aurora to address security from both a product and process perspective, as well as providing defense in depth through layered controls.

Cyber-security risks are constantly evolving, so continuous improvement in handling them is critical. By proactively exploring risks, investing in solutions, and collaborating with our industry partners,<sup>13</sup> we regularly incorporate security upgrades across our fleet in order to harden them against threats. We are dedicated to advancing security approaches and capabilities within all components to improve the security posture for future self-driving vehicles across the industry.

#### BUILDING AND LEARNING ON I-45 AND BEYOND

Today, Aurora Driver-powered Class 8 trucks (under the supervision of vehicle operators) support commercial operations between Dallas and Houston and between Fort Worth and El Paso. We plan to launch our driverless commercial operations on the Dallas to Houston lane on I-45 next year. In time, as we continue to mature, we look forward to expanding into new geographies to support our freight customers.

But let me be very clear: before a driverless Aurora Driver-powered vehicle touches a new lane, we will ensure that our safety case encompasses operation in that new environment. Moving into new geographies is something we will continue to do thoughtfully. In addition to understanding which claims in our safety case will need new evidence, we will also do the following:

We begin by *mapping*. We build our own high-definition maps, which contain detailed information about road infrastructure, geometry and lanes, and other geometric information. We build these maps automatically from data our vehicle collects and then augment that with human annotations of important road elements such as lanes, stop signs, and traffic lights on top of the world geometry.

Think about these as layers of data, which help our software system understand the world around it across three fronts:

1. Localization, which determines the vehicle's position relative to the map by matching the stored geometry data with what the sensors identify in real time;
2. Perception, which uses the geometry and annotations to allow the Aurora Driver to perceive other road users; and
3. Motion planning, which uses the annotations to prepare for maneuvers like turns and stops.

Importantly, when the Aurora Driver encounters changes in the real-world, on-road environment, they can be shared with our Aurora-powered fleet of vehicles.

With the map in hand we model and test any novel on-road scenarios or regulatory requirement unique to this new lane in *simulation*. There is a limit to how much meaningful data can be gathered through test tracks and on-road driving. Aurora has invested heavily in the development of a proprietary, highly accurate, and scalable Virtual Testing Suite. These tests become part of the evidence for the Proficient pillar of our expanded safety case.

With a map and an expanded and now closed safety case, we would then be ready to safely deploy the Aurora Driver on the new lane.

#### AURORA'S VIRTUAL TESTING SUITE

Aurora's Virtual Testing Suite enables us to repeatedly expose the Aurora Driver to common and rare on-road scenarios. And from virtual testing, we can understand how the Aurora Driver performs in millions of scenarios. Over time, new, interesting events are captured and added to our simulation database, where they are used to continually improve the system.

Aurora's Virtual Testing Suite makes it possible to amplify exposure to these events to test the Aurora Driver's performance in those scenarios.

We do this in two ways:

<sup>12</sup> NIST Special Publication 800-160 v2 Developing Cyber-Resilient Systems: A Systems Security Engineering Approach, 2021; ISO 21434 Road vehicle—Cybersecurity engineering, 2021; NHTSA Cybersecurity Best Practices for the Safety of Modern Vehicles, 2022.

<sup>13</sup> <https://avsc.sae-itc.org/>

- First, important but rare on-road events the Aurora Driver has encountered are turned into simulation tests. We then create variations to further challenge the system’s performance in these scenarios.
- Second, for events so rare the Aurora Driver has not experienced them on the road, we synthetically generate simulation tests using the established NHTSA collision categories, which enumerate the ways vehicles crash.

For these imminent collision scenarios and rare on-road events the Aurora Driver has encountered, we are creating tens of thousands of tests.

Similar to the expected performance of a human driver, the Aurora Driver is being designed to avoid a collision if possible, and if a collision is not avoidable—such as in scenarios where another actor’s behavior renders a collision inevitable—the Aurora Driver is designed to mitigate adverse outcomes. Success of these tests will give us the conviction that the Aurora Driver is designed to do the right thing in these rare scenarios.

In addition to evaluating the Aurora Driver in imminent collisions, we also looked at the available fatal collision details that involved a tractor trailer between the years 2018 and 2022 on our Dallas to Houston lane.

- We simulated those collisions to understand how the Aurora Driver would have acted under similar circumstances if it had been the initiating vehicle.
- Based on our analysis, we believe that had the Aurora Driver been driving, the combination of its powerful sensor suite and attentive driving behavior would have prevented these collisions.

Said simply, if the Aurora Driver had been driving the vehicle, none of these fatal collisions would have occurred.

#### WORKFORCE DEVELOPMENT

Aurora’s commercial-ready terminal in Palmer, Texas,<sup>14</sup> and our growing Command Center are great examples of how the AV industry will create new workforce opportunities across the country. Our terminals provide services necessary to operate and scale self-driving fleets, including fueling, weigh stations, on-site maintenance, sensor calibration, and more, while our Command Center supports vehicles through dispatch, remote assistance, incident response, and asset management functions. These functions will support safe operation of trucks on the road, help optimize fleet uptime, and, crucially, involve a range of new jobs.

Aurora has already created many new roles to support autonomous trucking technology and its scaled deployment, including:

- Terminal Operators who handle tasks within the terminals, including pre- and post-trip inspections, transfers and management of trailers, and logistics management.
- Fleet Support Technicians—the “Mechanics of the 21st Century”—who maintain autonomous trucks’ sensors and systems and maximize vehicle uptime.
- Command Center Specialists who, among other things, provide remote assistance and advice to the Aurora Driver when it comes across something unexpected on the road and needs guidance, like an unmapped road closure.
- Fleet Dispatch Specialists who manage AV fleets and help ensure availability for customers.
- Autonomous Vehicle Operations Specialists with commercial driver’s licenses (CDLs) who support the testing and validation of our autonomous trucks and passenger vehicles. These specialists will be essential in the coming years as we continue to develop and validate new capabilities for the Aurora Driver.
- Mapping Quality Specialists who process and triage map issues, including improving tooling for scalability of high-definition maps.

Aurora has cross-trained a number of its existing workforce to transition into many of these critical roles, and we’re working with local communities and academic institutions to build this workforce.

Demonstrating our commitment to workforce development, Aurora has worked with Pittsburgh Technical College to design an associate degree program that trains and accredits Fleet Support Technicians, giving them the tools they need to maintain AVs and support operations. This complements work with Gallatin College in Bozeman, Montana, where Aurora is investing in new educational facilities to train sensor technicians and develop advanced lidar sensors. As the need for these profes-

<sup>14</sup> <https://ir.aurora.tech/news-events/press-releases/detail/67/aurora-debuts-industry-leading-commercial-ready-terminal#:~:text=Aurora's%20South%20Dallas%20terminal%20was,is%20in%20commercial%20use%20today.>

sionals grows, academic degrees, technical training programs, and apprenticeships will be essential in building the workforce of the future.

Aurora is also supporting the Headwaters TechHub application submitted by a consortium of leaders in Montana to support the development of the photonics industry in the United States.<sup>15</sup> Specifically, Aurora has committed to collaborate with Montana State University (MSU) to operate a lidar test range; build a new 78,000 square foot facility in Bozeman, Montana, where Aurora will use a portion of the space to continue to grow our team and produce future generations of Aurora's FirstLight Lidar to support our expanding fleet of commercial AVs; and offer expertise for potential workforce development efforts based on the Gallatin College Photonics Program.

We ask Congress to ensure that commissioned research about the job-related impacts of AVs be driven by actual industry experience, and that job quality should be central to any policy and industry conversation. It is encouraging that a 2021 USDOT report indicated that potential reductions in long-haul trucking jobs related to AVs are likely to be offset by natural occupational turnover instead of layoffs.<sup>16</sup> Testing and deploying AV technology is a key component of ensuring there are real world models to ground these important conversations as we continue to learn more about new and transitioning jobs.

#### GOVERNMENT ENGAGEMENT

Aurora's engagement with all levels of government is a key component of the Trustworthy Principle in our Safety Case Framework. In this testimony, two examples will be discussed further: federal data reporting requirements and examples from our engagement with Texas.

##### *USDOT Reporting and Publicly Available Data*

Aurora takes part in two federal safety-related data reporting mechanisms. First, NHTSA's Standing General Order (SGO) for Crash Reporting for Incidents Involving Automated Driving Systems (ADS) and Level 2 Advanced Driver-Assistance Systems (ADAS). Second, the Federal Motor Carrier Safety Administration's (FMCSA) Safety and Fitness Electronic Records (SAFER) database system for motor carriers.

Under NHTSA's SGO, all AV manufacturers and operators, including Aurora, are required to report to the Agency certain crashes in which an ADS was engaged at any time within 30 seconds of the crash and the crash resulted in injury or property damage. NHTSA has made this data publicly available at regular intervals since the SGO was first released in 2021. The public can access and use this information to understand when and where crashes involving AVs have occurred without needing to contact the local or state authorities of the jurisdictions in which the AVs operate. Aurora submitted comments to NHTSA in 2021 describing how the Agency could improve the SGO's definitions and data collection requirements to ensure that the Agency receives targeted and actionable data regarding the safety of ADS operations. In addition, Aurora's comments provided suggestions to help ensure the public has accurate and reliable information regarding AV safety by aligning the SGO's terminology with the congressionally mandated TREAD Act early warning reporting regime already applicable to manufacturers.

Aurora has reported three collisions to NHTSA under the SGO. In the case of the collision we experienced in April of this year, a passenger vehicle sideswiped one of our Aurora Driver-powered trucks on the freight route between Fort Worth and El Paso. As the event unfolded, the Aurora Driver detected the incoming vehicle and began to move away from it by entering the shoulder of the road, in autonomy. The passenger vehicle continued to veer toward our truck at over 65 miles per hour, causing a collision. The Aurora Driver detected the imminent collision and our on-board vehicle operator took control of the truck, safely decreased speed, and pulled over. When deployed without a vehicle operator, the Aurora Driver is designed to execute this response autonomously while the Aurora Command Center contacts first responders.

After confirming the safety of our team, we immediately shared information about the incident with law enforcement, partners, and regulators, including Texas Department of Transportation (TXDOT) and Department of Public Safety (DPS). All of these actions align with our organizational preparation for scenarios like this, and

<sup>15</sup> <https://www.testersenate.gov/newsroom/press-releases/tester-urges-department-of-commerce-to-select-montana-application-for-regional-tech-hub-designation/>

<sup>16</sup> "Macroeconomic Impacts of Automated Driving Systems in Long-Haul Trucking," Jan. 28, 2021, FWHA-JPO-21-847, <https://rosap.nhtl.bts.gov/view/dot/54596>.

as part of our commitment to transparency, we shared information about the event with the public on our blog<sup>17</sup> in April.

In November 2022, we reported an incident to NHTSA in which a piece of wood was kicked up into our vehicle's windshield after going under the wheels of a truck to the left side of the Aurora truck, while the Aurora truck was in manual mode. The vehicle's windshield cracked but did not shatter. On July 18, 2023, an Aurora Class 8 truck was traveling southbound in autonomy mode on Interstate 45 near Exit 164 when the front windshield was struck by an unknown object. The bottom of the windshield had a small hole. The Aurora vehicle disengaged autonomy and pulled over. The vehicle was able to be driven from the scene, and there were no reported injuries.

FMCSA's SAFER system provides the government and the public with a concise electronic record of motor carrier safety data. By accessing the system, a user can obtain an electronic record of a company's identification, size, commodity information, and safety record, including the safety rating (if any), a roadside out-of-service inspection summary, and certain crash information. For example, through the SAFER system, a user can quickly see that Aurora has 46 registered power units (tractors) and 49 employed drivers, Aurora's operating status and classification, and the types of cargo Aurora hauls, among other information.<sup>18</sup>

#### *Snapshot from Texas*

Aurora believes that active communication with government agencies and communities at the national, state, and local level is an important aspect of our development and commercialization. Before Aurora started operating our vehicles on Texas roads, we engaged with TXDOT and TXDPS, and we have since briefed these agencies' staff at a regular cadence regarding our activities and planned expansion in the state. In addition, Aurora is a member of TXDOT's Connected and Automated Vehicle Task Force, which is composed of members from TXDOT, local governments and transportation officials throughout Texas, community members, Texas academic institutions, and industry. The task force regularly publishes industry updates to keep stakeholders informed about advancements in the technology. Separately, Aurora supported TXDOT's study on AVs required by Texas Senate Bill 1308 by participating in numerous workshops and providing presentations to stakeholders about how our technology works, our Texas operations, and how our technology will fit into the broader Texas transportation system.

Aurora also engages with government agencies and officials of the local jurisdictions in which we operate. In Texas, Aurora has met with the City of Dallas Transportation Director and has presented at a Border Trade Advisory Committee meeting in El Paso, which included the El Paso mayor and county commissioners and other elected officials. Aurora also notifies and works with local law enforcement agencies of the jurisdictions in which we operate. For example, we communicate with the City of Palmer Police Department, and we have contacted agencies in other local jurisdictions where we open new terminals.

Aurora has developed and shared Law Enforcement Interaction Plans (LEIPs) with our stakeholders to ensure they understand where, when, and how our vehicles operate so that if they do encounter them, they know how to safely interact with them. Aurora's current LEIPs are designed for interactions with our vehicles and vehicle operators, and we will release new versions when we have determined the Aurora Driver is acceptably safe to operate autonomously without human vehicle operators.

#### *Federal Policy*

There are opportunities for the federal government to support the development and deployment of AV technology in the United States, providing certainty that companies, including Aurora, continue to invest and build here.<sup>19</sup> Creating a level playing field where the rules are clear and conducive to realizing the safety, mobility, and efficiency benefits of AV technology is a necessary role of government.

Aurora supports the work of Members of this Committee, Congress, and the U.S. Department of Transportation (USDOT) to ensure that laws and regulations for AVs are performance-based and technology and business-model neutral.

<sup>17</sup> <https://blog.aurora.tech/safety/stories-from-the-road-safety-readiness-case-studies>

<sup>18</sup> In addition to the publicly available SAFER system, motor carriers are also required to maintain, and produce to FMCSA or authorized enforcement agencies upon request, an accident register of all crashes involving the motor carrier that have occurred in the past three years. 49 CFR 390.15.

<sup>19</sup> See "Forefront: Securing Pittsburgh's Break-out Position in Autonomous Mobile Systems," Sept. 2021, <https://ridc.org/news/autonomy-study/>.

Federal leadership supporting the development of AV technology here in the United States is critical. The work that started many years ago at USDOT under Secretary Foxx, continued under Secretary Chao, and carries through today under Secretary Buttigieg. USDOT's guidance, research, and rulemakings that have been initiated specific to AVs, along with the Department's use of its convening authority to bring stakeholders together, has laid the foundation for the future and there is still more work ahead.

#### *Modernizing Regulations*

We support NHTSA's efforts to modernize the Federal Motor Vehicle Safety Standards (FMVSS) and the FMCSA's efforts to modernize the Federal Motor Carrier Safety Regulations (FMCSR) to encourage the development of new and innovative AV technologies.

As you know, the FMVSS and FMCSR were not created with autonomous technology in mind and neither wholly contemplated the integration of autonomous technology, like the Aurora Driver, into vehicles. These frameworks, therefore, should be updated to account for this new technology as appropriate to provide regulatory certainty for developers of this technology and to improve the efficiency of its deployment. There are important open rulemakings at NHTSA and FMCSA<sup>20</sup> that need to continue to move forward. In preparation for other future regulatory actions, the agencies should continue providing guidance, conducting research, and fostering collaboration among stakeholders to support AV development. Additionally, existing exemption processes at USDOT should be used as a bridge to generate real-world data about innovative vehicle technologies that could inform future rulemakings that support AV deployment.

A timely example for the Subcommittee is the warning device exemption application filed with FMCSA at the beginning of this year and generally supported by the AV industry.<sup>21</sup> If approved, the exemption would allow Cab-Mounted Warning Beacons—a lighting system composed of forward- and rearward-facing amber flashing lights—to be used by autonomous trucks when stopped on the roadway in lieu of manually placing traditional warning triangles or flares around the vehicle, as required by regulation today.<sup>22</sup>

To support the application, two separate and independent studies (naturalistic and closed course) showed that Cab-Mounted Warning Beacons were equally or more effective in enabling road users to detect, recognize, and react to the hazard presented by a truck parked on the roadway when compared to warning triangles. Aurora's naturalistic study captured the responses of approximately 7,500 road users for the proposed warning device, across a variety of lighting conditions and interstate roadway geometries. Because there is no available FMCSA data of which we are aware that evaluates the effectiveness of traditional warning devices in motor carrier operations, the naturalistic study captured drivers' responses to both types of devices to support a data based decision.

The studies found that people slowed down and/or moved over when the Cab-Mounted Warning Beacons were activated, which is exactly what is expected and is consistent with the underlying regulation's safety purpose. Specifically, the studies showed that approaching drivers were able to see and understand the hazard, usually well beyond 300 meters behind the truck, and would slow down and/or change lanes away from the parked truck. This behavior was consistent with both the conventional warning devices and the Cab-Mounted Warning Beacons.

Approval of the exemption for motor carriers operating autonomous trucks to use Cab-Mounted Warning Beacons in lieu of traditional warning devices could also benefit conventional motor carrier operations in the future, where the proposed warning device may provide added protection to human drivers and to other road users. While the pending exemption application is limited to trucks operated by an ADS, in the future, the ability to use Cab-Mounted Warning Beacons could apply to all motor carrier operations. Use of the proposed warning device would provide human drivers with an immediate warning system to alert passing motorists when stopping on a roadway and eliminate the need for the driver to get out of their truck, enter the roadway, and walk hundreds of feet to place warning triangles or flares around the truck.

<sup>20</sup> See, e.g., NHTSA, Framework for Automated Driving Systems Safety, RIN 2127-AM15 and FMCSA, Safe Integration of Automated Driving Systems-Equipped Motor Vehicles, RIN 2126-AC17.

<sup>21</sup> <https://www.federalregister.gov/documents/2023/03/03/2023-04385/parts-and-accessories-necessary-for-safe-operation-exemption-application-from-waymo-llc-and-aurora>

<sup>22</sup> <https://www.freightwaves.com/news/on-the-roadside-dont-forget-the-safety-triangles>

There is strong support for the application. Freight and trucking partners of Aurora including Hirschbach, Werner, Uber Freight, and Volvo Autonomous Solutions have filed support statements in the Federal Register. In addition, Daimler Trucks, AVIA, Consumer Technology Association, TechNet, U.S. Chamber of Commerce, AUVSI, Kodiak, Waabi, and Gatik have filed statements of support with FMCSA for the exemption application. While more than eight months have passed since the application was filed, we remain hopeful that FMCSA will grant the application and use the five year exemption period to learn more about novel warning device solutions and the safe integration of AVs into the U.S. trucking fleet.

*Impact of the Current Regulatory Framework*

Aurora supports maintaining the existing self-certification process for motor vehicles in the United States, and believes companies should use Safety Case-based arguments, supported by evidence, to make safety determinations as discussed at length above.

We believe Congress should pass legislation confirming the federal government maintains its regulatory authority over the design, construction, and performance of AVs. Every vehicle that is on public roads, including an AV, is subject to the Motor Vehicle Safety Act, which provides NHTSA with broad authority over the safety of motor vehicles and motor vehicle equipment and to issue and update regulations as necessary for the purpose of reducing traffic crashes. States can, and should, continue to establish safety programs that address such intrastate operational issues as vehicle registration and insurance, driver testing and licensing, traffic rules, and highway design and maintenance. However, in the exercise of their responsibility over motor vehicle operations, states have adopted a widely varying and inconsistent patchwork of laws and regulations that may hinder the efficient and widespread adoption of AVs. There is tremendous value in leadership from the federal government supporting the AV industry through its convening authority to, as suggested in NHTSA's Preparing for the Future of Transportation: Automated Vehicles 3.0 (AV 3.0), provide technical assistance and best practices to states.

We agree with NHTSA's AV 3.0 that the federal government has the opportunity to encourage uniformity of state regulatory and operational environments. For example, states often have conflicting rules of the roads that make it difficult for all drivers, whether autonomous or human, to operate. Some jurisdictions require drivers to use a bike lane to make a right hand turn, while others prohibit doing so. We do not have a position on what is the safest option, but we do believe that uniformity across states would be beneficial for all road users, including the Aurora Driver. Congress could provide valuable guidance to states and NHTSA on tackling this patchwork of laws that affects all drivers, human and autonomous.

We will continue to encourage NHTSA and FMCSA to reach out to industry as they are developing AV-related policies and guidance. When appropriate, we will take the opportunity to comment on the record and suggest concrete improvements to those policies. For example, the difference between driver assistance systems and the autonomous system we are building is critical for the public to understand. The language and definitions the agencies use in regulations, orders, and guidance will drive the public discourse and need to be clear for all stakeholders. We will continue investing in an elevated public discourse on these topics. For example, Aurora is a founding member of PAVE, the Partnership for Automated Vehicle Education, because of how important we believe engagement and education is for all stakeholders.

CLOSING

Transparency and collaboration are key to our progress and future at Aurora. We are committed to continuing to work with the Subcommittee as it addresses these important issues and supports safety, innovation, and jobs across the United States. The incredible power and importance of our trucking industry here in the United States cannot be overstated. From making sure shelves around the country are stocked with essentials to the incredible increase in demand for 2-day home delivery, trucking is the backbone of the economy and, like every other industry, needs innovation to continue to thrive.

We are in the exciting and early stages of the next wave of safety innovation for the motoring public. I believe in the promise of AV technology, not for its own sake, but for the families, communities, and workplaces that will see the benefits of fewer crashes on our roads. Eliminating the loss of life on our roadway will not happen overnight, but we must move with urgency and automated vehicles will be part of the solution. The United States has been an incredible place to build and grow Aurora, and I look forward to seeing the nation benefit from this important technology.

Thank you for the opportunity to provide this testimony and to answer the Subcommittee's questions.

Mr. CRAWFORD. Well done and time to spare. I appreciate that. Before I recognize Mr. Farrah, I am going to ask you, if you would, to pull that microphone just a little bit closer to you so we can hear you just a little bit better because we are having a little bit of difficulty with the system.

So, with that, Mr. Farrah, you are recognized for 5 minutes.

**TESTIMONY OF JEFF FARRAH, EXECUTIVE DIRECTOR,  
AUTONOMOUS VEHICLE INDUSTRY ASSOCIATION**

Mr. FARRAH. Chairman Crawford, Ranking Member Holmes Norton, Ranking Member Larsen, members of the committee, it is a privilege to appear before you today and to lead the Autonomous Vehicle Industry Association.

For decades, autonomous vehicles were a technological aspiration of our country's most brilliant innovators. As we sit here today, autonomous vehicles are a reality and are increasingly being deployed on America's roads and highways using advanced technology to perform all aspects of the driving task.

One of the most promising applications is in autonomous trucking, which will deliver safer roads, as well as supply chain and global competitiveness benefits.

Since this subcommittee last examined autonomous trucks in February 2022, autonomous trucks have moved forward, bringing us closer to safer roads and more resilient supply chains.

Important and well-established companies are moving freight autonomously, including Walmart, FedEx, Kroger, and Tyson Foods.

We are at an exciting moment where Americans will begin to benefit from years of investment and technological advancement.

I want to make three important points.

First, safety drives everything we do in the autonomous vehicle industry. This starts from why people gravitate towards the industry and extends to how the technology is developed, tested, and deployed.

As you know, the safety status quo is unacceptable, and autonomous trucks will make us all safer. Sadly, nearly 43,000 people died on America's roads last year, and more than 5,800 of these were in truck crashes.

The overwhelming cause of crashes is human error, and autonomous trucks are designed to remove that error from the equation and are programmed to serve as model drivers.

There has never been a fatality involving an autonomous truck. Federal Government data demonstrates the remarkable safety record of AV trucks.

For more than 2 years, the Department of Transportation has required AV companies to report any incidents, even the most minor, when the technology is engaged. This is an incredible level of transparency.

The time period covered by the DOT data has been a period of significant growth for our industry. It is important to keep in mind that this is not an industry that is just getting off the ground. Autonomous vehicles have been safely testing and deploying for more



than a dozen years and have driven more than 45 million autonomous miles on U.S. public roads.

The more these vehicles drive, the safer they get, resulting in more American lives saved.

Second, autonomous trucking is a true win-win situation for America's workers and the economy as a whole.

This is National Truck Driver Appreciation Week, and I want to be clear: The autonomous trucking industry needs truckdrivers, who are vital to our Nation's supply chain.

Autonomous trucking will coexist with America's truckdrivers as it rolls out deliberately over a number of years. This is why a U.S. Department of Transportation-sponsored study found that autonomous trucking will increase U.S. employment up to 35,000 jobs per year on average in the next 30 years.

Freight volume will continue to increase in the United States with DOT estimating freight activity to grow 50 percent by 2050. Yet our country is struggling to keep up with the supply chain challenges of today's volume. The problem will only get worse in the future since our current truckdriver shortage of 78,000 is set to double by 2031.

If we fail as a country to meet this demand, we are holding back our farmers, ranchers, and manufacturers who must move their goods.

We believe autonomous trucking is one of the solutions to this problem and can help alleviate the driver shortage.

By helping to move more freight, we can create more opportunities for all, especially jobs for truckdrivers in their communities.

In addition to new economic opportunities, this will lead to a better quality of life for our Nation's truckdrivers.

Third, and finally, it is critical that policymakers embrace autonomous trucks to ensure U.S. global leadership and national security. We have been pleased to see the Department of Defense embrace autonomous trucks to execute its mission.

The United States is currently leading the way on autonomous trucks, but other countries, including China, are determined to realize the benefits of this technology.

AV trucks will be a part of the future of transportation. The only question is, which country will lead the way and reap the rewards? We must collectively make sure this country is the United States of America.

Thank you again for the opportunity to testify. I look forward to any questions.

[Mr. Farrah's prepared statement follows:]

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**Prepared Statement of Jeff Farrah, Executive Director, Autonomous Vehicle Industry Association**

I. INTRODUCTION

Chairman Crawford, Ranking Member Holmes Norton, distinguished members of the Subcommittee, it is my honor to testify before you today. The autonomous vehicle industry appreciates the strong engagement of members of this Subcommittee on autonomous vehicle ("AV") policy.

The Autonomous Vehicle Industry Association (“AVIA”) is the unified voice of the AV industry,<sup>1</sup> and we represent the world’s leading trucking, technology, ride-sharing, automotive, and transportation companies. This cross-section of companies demonstrates the widespread interest in developing AV technology across industries. Our mission is to bring the tremendous safety, mobility, transportation, and economic benefits of AVs—otherwise known as SAE International Levels 4- and 5-capable vehicles—to consumers and businesses in a safe, responsible, and expeditious manner.<sup>2</sup> Vehicles operated by AVIA members have driven more than 44 million autonomous miles on U.S. public roads, a distance roughly equivalent to 184 trips to the moon or 1,767 trips around the world.<sup>3</sup>

During the COVID-19 pandemic, our nation woke up to the importance of trucking to our nation’s economy. At AVIA, our members work to harness the power of technology to build the world’s safest trucks, which we believe will allow U.S. motor carriers and companies to further enhance segments of their trucking fleets and operations. AV technology is one of the critical tools in the continued evolution of the trucking industry, and can play a key role in complementing the work of trained, professional drivers.

For decades, AVs have been a technological aspiration for our country’s most brilliant innovators. Today, AVs are a reality and are increasingly being deployed on America’s roads and highways, using advanced technology to perform all aspects of the driving task. In states as diverse as Arizona, Arkansas, California, Florida, Michigan, and Texas, AVs provide valuable transportation services, transporting both passengers as part of autonomous ride-hailing fleets, and goods as part of trucking fleets and middle- and last-mile delivery operations. Autonomous trucking is one of the technology’s most promising applications and will deliver safer roads, as well as supply chain, global competitiveness, and workforce benefits.

Since this Subcommittee last examined autonomous trucks in a hearing in February 2022, the development of the autonomous trucking industry has increased significantly, bringing us closer to safer roads and more resilient supply chains. A diversity of well established companies, including Walmart, Kroger, FedEx, IKEA, and Tysons Foods, are partnering with AV truck developers to move freight. The confidence these companies and many others have in autonomous trucking represents a growing consensus in the trucking industry about the criticality of AV technologies. In addition, the U.S. Department of Defense has embraced autonomous technology, including technology developed by AVIA member companies, to keep America’s soldiers safer.<sup>4</sup> It is vital that policymakers also embrace the further development of autonomous trucking and other applications of dual-use AV technologies to protect the United States’ lead in an increasingly global industry, and ensure that the safety and economic benefits of AVs are felt by Americans across the country.

In recent years, the United States has faced unacceptably high levels of roadway crashes and fatalities, a trend that the adoption of autonomous trucks and other AVs can help combat. There is an epidemic of deaths on America’s roads, with over 42,000 traffic fatalities in both 2021<sup>5</sup> and 2022,<sup>6</sup> according to National Highway Traffic Safety Administration’s (“NHTSA”) estimates. In 2022 alone, 5,887 people

<sup>1</sup>Our members include: Apple, Aurora, Cavnu, Cruise, Embark, Ford, Gatik, Kodiak, Lyft, May Mobility, Motional, Nuro, TuSimple, Uber, Volkswagen Group of America, Volvo, Volvo Autonomous Solutions, Waabi, Waymo, and Zoox. See *Our Mission and Members*, AVIA, <https://theavindustry.org/about/mission>.

<sup>2</sup>SAE’s J3016 standards have been adopted industry wide. Level 2 systems (often called advanced driver assistance systems or “ADAS”) are available on vehicles today and are capable of “partial driving automation,” requiring human supervision at all times. Level 3 vehicles have “conditional driving automation,” where the vehicle requires human interaction only in specific situations. Only Level 3, 4, and 5 vehicles are equipped with automated driving systems (“ADS”). See *Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles—J3016\_202104*, SAE International, [https://www.sae.org/standards/content/j3016\\_202104/](https://www.sae.org/standards/content/j3016_202104/) (last visited Sept. 10, 2023).

<sup>3</sup>AVIA *Data Shows 44 million+ Driven And Outstanding Safety Record*, AUTONOMOUS VEHICLE INDUS. ASS’N, <https://theavindustry.org/resources/blog/data-44million-miles> (last visited Sept. 10, 2023).

<sup>4</sup>*Kodiak and the U.S. Army’s Autonomous Driving Program*, AUTONOMOUS VEHICLE INDUS. ASS’N, <https://theavindustry.org/resources/blog/kodiak-and-the-us-army-autonomous-driving-program> (last visited Sept. 10, 2023).

<sup>5</sup>NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT OF TRANSP., DOT HS 813 298, EARLY ESTIMATES OF MOTOR VEHICLE TRAFFIC FATALITIES AND FATALITY RATE BY SUB-CATEGORIES IN 2021, 1 (2022), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813298>.

<sup>6</sup>NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT OF TRANSP., DOT HS 813 428, EARLY ESTIMATE OF MOTOR VEHICLE TRAFFIC FATALITIES IN 2022, 1 (2023), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813428>.

died in crashes involving large trucks, a 2% increase in fatalities from 2021.<sup>7</sup> This increase is part of a decade-long pattern, with a 47% increase in such fatalities between 2011 and 2021.<sup>8</sup> Further, 2021 saw large trucks involved in over 117,000 crashes that resulted in an injury, a 12% increase from 2020.<sup>9</sup> Autonomous vehicles are programmed to be model drivers, staying at or below the speed limit and observing traffic laws and rules of the road. Autonomous trucking technology is designed to improve the safety of commercial truck driving by eliminating blind spots, having 360 degree perception of its surroundings, and safely navigating around other road users.

Autonomous trucks have already demonstrated a remarkable safety record, without a single fatality in more than seven years of operations and millions of miles driven on public roads. This safety record is supported by data collected by NHTSA. For over two years, NHTSA has required AV companies to report every incident—no matter how minor—that occurs while an automated driving system (“ADS”) is engaged as part of Standing General Order 2021–01 (“SGO”).<sup>10</sup> During this period, only one reported incident involving an autonomous truck resulted in injuries, and the cause of that incident was a human-driven vehicle that collided with an autonomous truck. As the autonomous trucking industry continues to grow, so will the roadway safety improvements the technology provides.

The further deployment and integration of autonomous trucks into America’s logistics network will help optimize the transportation of freight nationwide, bringing goods directly to consumers faster and helping to ease the ongoing supply chain crisis. At present, the United States is not hauling all the freight it could, and this is holding back our farmers, ranchers, and manufacturers. This gap is due to a variety of factors, including a truck driver shortage that the American Trucking Association estimates to be nearly 78,000 truck drivers. This number is set to double by 2031.<sup>11</sup> Autonomous trucking offers a means to address supply chain inefficiencies by filling workforce gaps, enhancing fleet flexibility, and reducing travel times.

American workers also stand to benefit from the gradual adoption of autonomous trucking. A U.S. DOT-funded study found that autonomous trucking will increase U.S. employment by up to 35,000 jobs per year on average.<sup>12</sup> As demand for freight hauling continues to grow, automated trucks can help shippers keep up with that demand, supplementing and augmenting human driven fleets. With AVs hauling more long-haul freight, more opportunities will be created for truck drivers in their communities. This will also allow companies to strategically place their drivers where they are needed most, and ensure America’s truck drivers can remain in and near their communities and sleep in their own beds.

Let me be clear: autonomous vehicles must coexist with America’s truck drivers and the goal of industry is to create more opportunity for all in our country. The autonomous vehicle industry needs America’s truck drivers as partners in addressing the supply chain challenges our country faces. A growing AV industry will also continue to create new job opportunities at AV trucking companies for workers with a range of educational backgrounds and experiences, including local drivers, technicians, operations center workers, and more.

The wider adoption of AVs will also bring important fuel efficiency benefits, with studies pointing to a 10% cut in fuel consumption for autonomous trucks.<sup>13</sup> AVs will produce more environmental benefits compared to traditional vehicles.

The widespread distribution of the benefits of autonomous trucking depends in part on the continued U.S. global leadership in the AV industry. The United States is currently leading the way on autonomous trucks, but China and other countries are determined to catch up and surpass the United States’ progress. Only if policy-makers and industry work together to build a robust AV ecosystem that includes

<sup>7</sup> NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEPT OF TRANSP., DOT HS 813 448, EARLY ESTIMATE OF MOTOR VEHICLE TRAFFIC FATALITIES AND FATALITY RATE BY SUB-CATEGORIES IN 2022, 1 (2023), <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813448>.

<sup>8</sup> Nat’l Safety Council, *Large Trucks*, NSC INJURY FACTS, <https://injuryfacts.nsc.org/motor-vehicle/road-users/large-trucks/> (last visited Sept. 10, 2023).

<sup>9</sup> *Id.*

<sup>10</sup> See NAT’L HIGHWAY TRAFFIC SAFETY ADMIN., SECOND AMENDED STANDING GENERAL ORDER 2021–01 (2023), [https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-04/Second-Amended-SGO-2021-01\\_2023-04-05\\_2.pdf](https://www.nhtsa.gov/sites/nhtsa.gov/files/2023-04/Second-Amended-SGO-2021-01_2023-04-05_2.pdf).

<sup>11</sup> *Driver Shortage Update 2022*, AM. TRUCKING ASS’N (Oct. 25, 2022), [https://ata.msgfocus.com/files/amf\\_highroad\\_solution/project\\_2358/ATA\\_Driver\\_Shortage\\_Report\\_2022\\_Executive\\_Summary.October22.pdf](https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_Driver_Shortage_Report_2022_Executive_Summary.October22.pdf).

<sup>12</sup> ROBERT WASCHIK ET AL., JOHN A. VOLPE NAT’L TRANSP. SYS. CTR., FHWA–JPO–21–847, MACROECONOMIC IMPACTS OF AUTOMATED DRIVING SYSTEMS IN LONG-HAUL TRUCKING, 1 (2021), <https://rosap.ntl.bts.gov/view/dot/54596>.

<sup>13</sup> *Self-Driving Trucks Cut Fuel Consumption by 10%*, SAE INTERNATIONAL (Dec. 19, 2019), <https://www.sae.org/news/2019/12/tusimple-autonomous-trucks-cut-fuel>.

autonomous trucks can we ensure that American workers and consumers are able to reap the full benefits of AVs.

## II. AV TECHNOLOGY IS A VITAL TOOL FOR IMPROVING ROADWAY SAFETY

The United States is in the midst of an epidemic of roadway fatalities and injuries, which autonomous trucks and other AVs can alleviate. America's roads have become increasingly dangerous for truck drivers and other road users alike. 2022 saw over 42,000 deaths on America's roads,<sup>14</sup> with 5,887 of those deaths involving at least one large truck.<sup>15</sup> The 2022 statistics, egregious as they are on their own, show only part of the story when it comes to traffic fatalities on our roads. Unfortunately, traffic deaths have been steadily rising over the last decade, increasing by 47% between 2011 and 2021, and by an additional 2% between 2021 and 2022.<sup>16</sup> A National Safety Council analysis of NHTSA data showed a 12% increase in injuries from crashes involving a large truck from 2020 to 2021, and recorded over 117,000 such incidents in 2021 alone.<sup>17</sup>

Human error, including speeding, unfamiliarity with the roadway, and fatigue, is a major contributor to roadway incidents. Autonomous trucks are designed to remove that error from the equation, as they do not drive distracted or tired. AVs have built a significant safety record through more than a decade of development, testing, and deployment. ADS-equipped vehicles have now driven millions of miles autonomously, with vehicles operated by AVIA members driving more than 44 million autonomous miles on public roads in the U.S. alone.<sup>18</sup> Reinsurer Swiss Re recently published an analysis of 3.8 million autonomous miles driven by passenger AVs operated by AVIA member Waymo. The analysis found that when compared to baseline human drivers, Waymo AVs reduced bodily injury claims by 100 percent, and reduced property damage claims by 76 percent.<sup>19</sup> These results led Swiss Re to conclude that Waymo's AVs are "significantly safer towards other road users than human drivers are."<sup>20</sup> Another analysis by Cruise, an AVIA member that has likewise driven more than one million miles autonomously, found that when benchmarked against human drivers the company's AVs were involved in 54% fewer collisions overall, and 73% fewer collisions with a meaningful risk of injury.<sup>21</sup>

Autonomous trucks have also demonstrated a strong safety record. Fourteen incidents involving an autonomous truck have been reported under NHTSA's SGO in over two years of data collection, and only one reported incident involved injuries. That sole incident was caused by a human-operated vehicle cutting into the AV's lane and colliding with the AV. In contrast, 5,788 people died<sup>22</sup> and 117,000 people were injured in incidents involving traditional large trucks in 2021 alone.<sup>23</sup>

AV safety is also subject to detailed requirements and multiple layers of regulatory oversight at the federal level. Both passenger AVs and autonomous trucks are regulated by NHTSA,<sup>24</sup> which administers broadly applicable motor vehicle safety standards and collects incident data from AV companies under the SGO. NHTSA also has authority to recall vehicles that present an unreasonable risk to safety, removing such vehicles from the road when necessary. This structure ensures room for innovation in motor vehicle technologies while retaining rigorous oversight on manufacturers.

Autonomous trucks are also subject to an additional legal framework established by the FMCSA, a regulatory structure for which there is no parallel for passenger vehicles. FMCSA administers standards for commercial motor vehicles ("CMV") related to safety, inspections, hazardous materials, drivers, and enforcement. With respect to interaction with weigh stations and the commercial vehicle inspection sys-

<sup>14</sup> NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 7.

<sup>15</sup> NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., *supra* note 8.

<sup>16</sup> *Id.*

<sup>17</sup> Nat'l Safety Council, *supra* note 9.

<sup>18</sup> AUTONOMOUS VEHICLE INDUS. ASS'N, *supra* note 3.

<sup>19</sup> LUIGI DI LILLO ET AL., COMPARATIVE SAFETY PERFORMANCE OF AUTONOMOUS AND HUMAN DRIVERS: A REAL-WORLD CASE STUDY OF THE WAYMO ONE SERVICE (2023), <https://arxiv.org/ftp/arxiv/papers/2309/2309.01206.pdf>.

<sup>20</sup> *Id.*

<sup>21</sup> Louise Zhang, *Cruise's Safety Record Over 1 Million Driverless Miles*, CRUISE (Apr. 28, 2023), <https://getcruise.com/news/blog/2023/cruises-safety-record-over-one-million-driverless-miles/>.

<sup>22</sup> NAT'L HIGHWAY TRAFFIC SAFETY ADMIN., U.S. DEP'T OF TRANSP., DOT HS 813 435, OVERVIEW OF MOTOR VEHICLE TRAFFIC CRASHES IN 2021, 18 (2021).

<sup>23</sup> Nat'l Safety Council, *supra* note 9.

<sup>24</sup> Like all motor vehicles, AVs are subject to the U.S.'s longstanding self-certification process, which relies on thorough safety testing by manufacturers without the costly and laborious pre-approval structures found in Europe and elsewhere.

tem, our members have worked closely with the Commercial Vehicle Safety Alliance (“CVSA”), motor carriers, and law enforcement to develop a robust inspection process for autonomous trucks, which CVSA calls the Enhanced CMV Inspection Program for autonomous trucks.<sup>25</sup> Moreover, safety operators in autonomous trucks are subject to relevant requirements established by FMCSA, such as Commercial Driver’s License requirements and hours of service limitations.

In March of 2023, AVIA published a federal policy framework for AVs,<sup>26</sup> which would build on efforts by NHTSA and FMCSA and support the safe and efficient deployment of AVs across the country. In the framework, AVIA calls for several policies that the U.S. DOT could undertake to assist the wider deployment of autonomous trucks, including, but not limited to:

- Codification of FMCSA’s 2018 interpretation that the Federal Motor Carrier Safety Regulations (“FMCSRs”) do not require a human driver to operate or be present in a CMV being operated by a Level 4 or Level 5 ADS.
- Completion of the Final Rule on Safe Integration of ADS in Commercial Motor Vehicles. FMCSA should swiftly complete a rule or series of rules that will encourage autonomous truck developers to safely expand operations and commercialization. This would include updating existing human-focused hours of service and drug testing rules to reflect the operational realities of ADS-equipped vehicles.

The adoption of these policies by the U.S. DOT would support the growth of the autonomous trucking industry while retaining traditional federal oversight of commercial vehicle operations.

### III. AVS HOLD TREMENDOUS ECONOMIC PROMISE AND CAN HELP CREATE NEW JOBS WHILE ALLEVIATING SUPPLY CHAIN CHALLENGES

The continued development of autonomous trucking will fundamentally improve interstate commerce by improving the manner in which goods move in our country, with autonomous trucks increasing middle-mile and long-haul efficiency and capacity, and in turn improving the efficiency of countless industries that rely on moving goods on trucks, such as agriculture, retail, and manufacturing. The disruptions born of the COVID-19 pandemic have shed light on the fragility of supply chains and choke points in how we move goods and materials of all kinds. Supply chain failures make it harder for farmers to get their crops to market, while leaving consumers scrambling for finished products as store shelves empty. By 2026, AVs could represent not only a potential \$1 trillion market,<sup>27</sup> but also a key solution to supply chain troubles, all while decreasing transportation costs and improving safety.

One major supply chain challenge facing the United States is a shortage of nearly 78,000 truck drivers, and that figure is projected to almost double by 2031.<sup>28</sup> Given the deliberate timeline for AV truck deployment, autonomous trucking will not cause significant displacement of current jobs in the trucking industry,<sup>29</sup> but it can serve as one tool to reduce strains on the supply chain caused, in part, by the long-standing truck driver shortage. At the same time, AV trucking also holds substantial potential to decrease the cost of consumer goods, reduce delivery costs, and raise earnings for workers across the economy.

#### A. AVs Will Help Grow the American Economy

The wider deployment of autonomous trucks will have economic benefits far beyond the trucking industry. By 2050, the value of public and consumer benefits of AV deployment, including reduced congestion, avoided accidents, and saved time, could add up to \$796 billion annually.<sup>30</sup> In California alone, the knock on effects of the introduction of autonomous trucking could increase the state’s real GDP and

<sup>25</sup> See COMMERCIAL VEHICLE SAFETY ALLIANCE, CVSA ANNOUNCES NEW ENHANCED CMV INSPECTION PROGRAM FOR AUTONOMOUS TRUCK MOTOR CARRIERS (Oct. 4, 2022), <https://www.cvsa.org/news/new-enhanced-cmv-inspection-program/>.

<sup>26</sup> AUTONOMOUS VEHICLE INDUS. ASS’N, FEDERAL POLICY FRAMEWORK FOR OUR AV FUTURE (MARCH 2023), <https://theavindustry.org/resources/AVIA-Federal-Policy-Framework-for-Our-AV-Future.pdf>.

<sup>27</sup> TECONOMY PARTNERS, FOREFRONT: SECURING PITTSBURGH’S BREAK-OUT POSITION IN AUTONOMOUS MOBILE SYSTEMS ES-1-2 (2021), <https://ridc.org/wp-content/uploads/2021/10/PGH-Autonomy-Report-Executive-Summary.pdf>.

<sup>28</sup> AM. TRUCKING ASS’N *supra* note 12.

<sup>29</sup> See SECURING AMERICA’S FUTURE ENERGY, AMERICA’S WORKFORCE AND THE SELF-DRIVING FUTURE REALIZING PRODUCTIVITY GAINS AND SPURRING ECONOMIC GROWTH (June 2018), [https://aworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE\\_AV\\_Policy\\_Brief.pdf](https://aworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE_AV_Policy_Brief.pdf).

<sup>30</sup> *Id.* at 9.

welfare by at least \$6 billion a year.<sup>31</sup> Given this, policies that support the further development of the AV industry will help grow the U.S. economy and support the economic competitiveness of American businesses across many industries, in turn supporting the continued growth of the U.S. economy.<sup>32</sup>

The growth in autonomous trucking is poised to run in parallel with an ever-growing market for freight trucking, with the Bureau of Transportation Statistics estimating that freight activity in the United States alone will grow fifty percent from 2020 to 2050, reaching a projected value of \$36.2 trillion. With trucking representing roughly 72% of all freight transportation tonnage,<sup>33</sup> the number of trucks on the road, autonomous and human driven, will need to grow as well. AVs will be able to help fill that demand and supplement existing human drivers.

For consumers, AVs are positioned to reduce general transportation costs and the cost of goods, and ensure goods are made more readily available and closer to home. Sixty-five percent of U.S. consumable goods are brought to market by trucks, and the implementation of autonomy in the trucking sector stands to decrease operating costs by about 45%—resulting in savings between \$85 billion and \$125 billion, which can be passed on to consumers and transportation workers.<sup>34</sup> Finally, through the introduction of shared AV fleets, transportation costs—which amount to the second-largest expense for most households—could be reduced by as much as \$5,600 per year.<sup>35</sup> The wider deployment of AVs for consumer deliveries and personal transportation would be particularly impactful in food deserts, rural communities, and other areas that do not have significant, accessible public transit options.<sup>36</sup>

Preserving American leadership in the AV industry is key to ensuring that the economic benefits of AV deployment reach American companies, workers, and consumers. By developing a supportive national AV policy framework, the federal government can promote widespread AV deployment and commercialization, which will help secure continued U.S. leadership against foreign competitors and unlock greater opportunities for American companies to test and deploy AVs safely.

#### *B. Autonomous Trucks Can Create New Jobs and New Opportunities for the Transportation Workforce*

Autonomous trucks will be part of a comprehensive trucking ecosystem that coexists with human truck drivers, and ultimately the customers of AV trucking companies will decide how the technology is applied in the marketplace. We need truck drivers and they are a vital part of America's supply chain. The adoption of this technology will not lead to mass layoffs, and can help create a positive lifestyle change for thousands of truckers, allowing them to stay closer to home instead of driving routes that keep them on the road for weeks at a time. The technologies being developed and deployed by AVIA members will allow drivers to spend more nights in their own beds instead of in the sleeper berth of a truck.

As noted above, the U.S. trucking industry also faces a longstanding shortage of drivers, and is currently short of nearly 80,000 truck drivers due to a long-term decline in new drivers entering the profession, and an annual turnover rate exceeding 90% in certain parts of the industry.<sup>37</sup> AVs can help fill the gap and, as the demand for freight carrying grows, expand the industry's carrying capacity over time by supplementing human operated vehicles. Given the timeline for AV truck deployment, autonomous trucking will not likely cause significant displacement of jobs in the trucking industry,<sup>38</sup> but it can serve as one tool to reduce strains on the supply

<sup>31</sup> *Autonomous Long-Haul Trucking Stands to Grow the Golden State's Economy While Creating Jobs and Raising Wages Without Mass Driver Layoffs*, SILICON VALLEY LEADERSHIP GROUP (Apr. 13, 2022), <https://www.svlg.org/study-shows-autonomous-trucking-will-grow-californias-economy/>.

<sup>32</sup> Jack Caporal, William O'Neil, and Sean Arrieta-Kenna, *Bridging the Divide: Autonomous Vehicles and the Automobile Industry*, CSIS (Apr. 14, 2021), <https://www.csis.org/analysis/bridging-divide-autonomous-vehicles-and-automobile-industry>.

<sup>33</sup> *ATA Truck Tonnage Index Increased 2.4% in May*, AM. TRUCKING ASS'N (July 20, 2023), <https://www.trucking.org/news-insights/ata-truck-tonnage-index-increased-24-may>.

<sup>34</sup> Aisha Chottani, Greg Hastings, John Murnane, and Florian Neuhaus, McKinsey & Co., *Distraction or Disruption? Autonomous Trucks Gain Ground in US Logistics* (Dec. 10, 2018), <https://www.mckinsey.com/industries/travel-logistics-and-infrastructure/our-insights/distraction-or-disruption-autonomous-trucks-gain-ground-in-us-logistics>.

<sup>35</sup> SAFE, *FOSTERING ECONOMIC OPPORTUNITY THROUGH AUTONOMOUS VEHICLE TECHNOLOGY* (July 2020), <https://safe2020.wpenginepowered.com/wp-content/uploads/2020/07/Fostering-Economic-Opportunity-through-Autonomous-Vehicle-Technology.pdf>.

<sup>36</sup> See Joann Muller, *How Autonomous Vehicles Could Improve Mobility for the Poor*, AXIOS (July 17, 2020), <https://www.axios.com/2020/07/17/autonomous-vehicles-mobility-poverty>.

<sup>37</sup> AM. TRUCKING ASS'N, *supra* note 12.

<sup>38</sup> See SECURING AMERICA'S FUTURE ENERGY, *supra* note 39.

chain. Indeed, a U.S. DOT study has found that most autonomous trucking adoption scenarios would not lead to layoffs for existing truckers.<sup>39</sup>

Beyond truck driving, the further adoption of autonomous trucking will support employment overall. A recent study found that in California, which already allows smaller AVs to operate, the introduction of autonomous trucking would create 2,400 jobs.<sup>40</sup> A Federal Highway Administration study has found that the adoption of autonomous trucking will increase total U.S. employment by up to 35,100 jobs per year on average and raise annual earnings for all U.S. workers by between \$203 and \$267 per worker per year.<sup>41</sup>

The AV industry itself has already created new jobs and brought new investment, tax revenue, resources, and human capital to states across the country, including Arkansas, California, Alabama, Arizona, Arkansas, Kansas, Nevada, New Mexico, Oklahoma, Pennsylvania, Michigan, Florida, Washington, Colorado, and Texas. In communities across those states, the AV industry is providing opportunities for workers with a wide array of expertise and educational backgrounds, including many jobs that do not require a college degree. These jobs include auto technicians, fleet managers, safety operations specialists, sensor calibrators, transportation planners, and many others to serve the growing needs of AV fleets and AV manufacturers. As the industry continues to expand, delivery workers and grocery store employees will be involved in selecting, packing, and delivering goods to consumers, among other jobs and roles. The wider deployment of AVs can create over three million new jobs by 2035, all while expanding access to affordable delivery services, according to a study conducted by Steer.<sup>42</sup>

The AV industry is also investing in partnerships to create the jobs of tomorrow. These investments not only move AV technology forward, but also prepare the American workforce to compete globally. For example, AVIA member Aurora has partnered with Pittsburgh Technical College to create and launch a new associate degree program that trains autonomous service engineer technicians.<sup>43</sup> Similarly, AVIA member Nuro has developed programs with De Anza Community College in California and San Jacinto Community College in Texas that offer a new career pathway to prepare the next generation of autonomous fleet technicians.<sup>44</sup> The initiatives include a free tuition option, access to paid internships and part time work, and preference for full time jobs with and benefits upon graduation. In San Francisco, another AVIA member, Cruise, partners with a local non-profit organization, Humanmade,<sup>45</sup> to help build bridges between historically underserved communities and the advanced manufacturing economy through skills training, education, access to advanced tools and machinery, interview workshops and other resources.

#### IV. U.S. LEADERSHIP IN AV TECHNOLOGY CONTINUES TO FACE CHALLENGES

Today, the United States is the global leader in the AV industry, with a robust ecosystem of American companies working on all aspects and applications of the technology. However, the United States must not assume it will win the global AV race and sustain its leadership position in a market potentially worth multiple trillions of dollars.<sup>46</sup> To ensure continued U.S. leadership in AV development and de-

<sup>39</sup> ROBERT WASCHIK ET AL., *supra* note 13.

<sup>40</sup> SILICON VALLEY LEADERSHIP GROUP *supra* note 41.

<sup>41</sup> ROBERT WASCHIK ET AL., *supra* note 13.

<sup>42</sup> STEER, ECONOMIC IMPACTS OF AUTONOMOUS DELIVERY SERVICES IN THE U.S. xi (2020), [https://www.steergroup.com/sites/default/files/2020-09/200910\\_%20Nuro\\_Final\\_Report\\_Public.pdf](https://www.steergroup.com/sites/default/files/2020-09/200910_%20Nuro_Final_Report_Public.pdf).

<sup>43</sup> *Pittsburgh Technical College Launches Robotics and Autonomous Engineering Technology Program*, PITTSBURGH TECHNICAL COLLEGE, [https://www.pgtech.org/news-and-publications/PTC\\_Robotics](https://www.pgtech.org/news-and-publications/PTC_Robotics) (last visited Sept. 10, 2023).

<sup>44</sup> *Autonomous and Electric Vehicle Technician Pathway*, DE ANZA COLLEGE, <https://www.deanza.edu/autotech/av> (last visited Sept. 10, 2023); Press Release, San Jacinto College and Nuro, San Jacinto College and Nuro Announce First AV Technician Certificate Program in Texas (Feb. 24, 2023), <https://www.newsfilecorp.com/release/156026/San-Jacinto-College-and-Nuro-Announce-First-AV-Technician-Certificate-Program-in-Texas>.

<sup>45</sup> *Workforce Development Programs*, HumanMade, <https://www.humanmade.org/workforce-development> (last visited Sept. 10, 2023).

<sup>46</sup> SONIA ABHAY, ALLIED MARKET RESEARCH, AUTONOMOUS VEHICLE MARKET BY LEVEL OF AUTOMATION (LEVEL 1, LEVEL 2, LEVEL 3, LEVEL 4, AND LEVEL 5), APPLICATION (CIVIL, DEFENSE, TRANSPORTATION & LOGISTICS, AND CONSTRUCTION), DRIVE TYPE (SEMI-AUTONOMOUS AND FULLY AUTONOMOUS), AND VEHICLE TYPE (PASSENGER CAR AND COMMERCIAL VEHICLE): GLOBAL OPPORTUNITY ANALYSIS AND INDUSTRY FORECAST, 2021–2030 (2022), <https://www.alliedmarketresearch.com/autonomous-vehicle-market>; TECONOMY PARTNERS, *supra* note 37.

ployment, we must get three things right: technology development; capital investment; and public policy.<sup>47</sup>

The United States is leading in the first two categories. AVs are an American invention, with many of the leading voices in AV development today having participated in Defense Advanced Research Projects Agency (“DARPA”)-sponsored challenges in the early 2000s. The work of these pioneers led to an explosion in AV development over the last decade, as they built dynamic companies across the United States. American companies have developed the most advanced AV technology to date, and billions have been invested in innovative AV companies, ranging from dogged startups to established players with experience scaling in the transportation sector.

Despite this lead, the United States is at severe risk of falling behind the rest of the world on AV public policy, which would deny Americans the technology’s life-saving mobility and efficiency benefits and harm the United States’ global economic competitiveness. The American AV industry is at an inflection point, as the technology is now being commercialized and the benefits of AVs are beginning to accrue. Now is the time for policymakers to establish a national policy framework that prioritizes American leadership and has Congress, the U.S. DOT, and the private sector acting in partnership. While federal efforts to establish such a framework have stalled in the last several years, a majority of states have recognized the benefits of AVs by expressly approving AV operations on their roads.

Make no mistake: the United States can continue to lead the way on AVs, if we as a nation clear the path to safe commercialization and do so with urgency. The United States must commit itself to AV leadership to ensure that the safety, economic, mobility, and efficiency benefits of AVs can be felt not only in the states where AVs are already on the road, but nationwide.

#### A. Competition on AV Leadership from Abroad

America’s leadership role is integral to securing the economic growth, job creation, and many safety and societal benefits offered by AVs. The United States currently faces considerable foreign competition, including from China, Europe, and Japan.

*China.* China’s government has invested heavily in the development of AVs in recent years as part of its strategy to overtake and replace foreign market leaders, leading to projections that China’s share of the AV market will be worth approximately 50% of the market’s overall estimated value by 2025.<sup>48</sup> Reflecting China’s investment in AVs, the Chinese government issued a joint strategy in 2020 prioritizing AV development and establishing goals for the large-scale production of AVs by 2025, calling for at least 20% of all new vehicles sales to have SAE Level 4 capabilities by 2030.<sup>49</sup> In 2022, China’s Ministry of Transportation released rules in an effort to commercialize driverless mobility.<sup>50</sup> Meanwhile, eight major cities in China currently allow testing of driverless ride-hailing services, and multiple AV companies have obtained permits in these cities to operate autonomous taxis.<sup>51</sup> One company, AutoX, backed by e-commerce giant Alibaba, announced the launch of autonomous taxis on public roads across an area three times the size of Manhattan within Shenzhen in January 2021.<sup>52</sup> Apollo Go, backed by China’s leading search engine, Baidu, began publicly testing its robotaxis in Shanghai in September 2021.<sup>53</sup> According to Baidu, one million rides have already been completed since it rolled out the service, and it plans to expand into dozens of other Chinese cities by 2030.<sup>54</sup>

<sup>47</sup> See also *Economic Danger Zone: How America Competes to Win the Future Versus China: Hearing Before the Subcom. on Innovation, Data, and Com. of the H. Comm. on Energy and Com.*, 118th Cong. (2023) (statement of Jeff Farrah, Executive Director, Autonomous Vehicle Industry Association), [https://theavindustry.org/resources/testimony/Witness\\_Testimony\\_Farrah\\_IDC\\_2023\\_02\\_01\\_Hearing\\_dac1666f21.pdf](https://theavindustry.org/resources/testimony/Witness_Testimony_Farrah_IDC_2023_02_01_Hearing_dac1666f21.pdf).

<sup>48</sup> See Anjani Trivedi, *China Sets the Rules of the Road*, WASH. POST (Oct. 12, 2022, 6:31 PM), [https://www.washingtonpost.com/business/china-sets-the-rules-of-the-road/2022/10/11/db25bdda-49b0-11ed-8153-96ee97b218d2\\_story.html](https://www.washingtonpost.com/business/china-sets-the-rules-of-the-road/2022/10/11/db25bdda-49b0-11ed-8153-96ee97b218d2_story.html).

<sup>49</sup> Takashi Kawakami & Naoshige Shimizu, *China’s Self-Driving Car Push Hits Legal and Cost Roadblocks*, NIKKEI ASIA (Jan. 19, 2023), <https://asia.nikkei.com/Business/Automobiles/China-s-self-driving-car-push-hits-legal-and-cost-roadblocks>.

<sup>50</sup> See Anjani Trivedi, *supra* note 58.

<sup>51</sup> *Id.*

<sup>52</sup> Rita Liao, *China’s Robotaxis Charged Ahead in 2021*, TECHCRUNCH (Jan. 14, 2022, 8:20 AM), <https://techcrunch.com/2022/01/14/2021-robotaxi-china/>.

<sup>53</sup> Rebecca Bellan, *Chinese Tech Giant Baidu Robotaxis Publicly Testing Apollo Go Robotaxis in Shanghai*, TECHCRUNCH (Sept. 14, 2021, 1:24 AM), <https://techcrunch.com/2021/09/13/chinese-tech-giant-baidu-begins-publicly-testing-apollo-go-robotaxis-in-shanghai/>.

<sup>54</sup> *Robotaxis are taking over China’s roads. Here’s how they stack up to the old-fashioned version*, CBS NEWS (Aug. 18, 2022), <https://www.cbsnews.com/news/china-robotaxis-self-driving-cabs-taking-over-cbs-test-ride/>.



Baidu expanded its driverless ride-hailing services to public roads in Beijing in April 2022, where another China-based AV company, Pony.ai, also deploys driverless robotaxis.<sup>55</sup> In August, Baidu received a permit to carry passengers from central Wuhan to the Wuhan Tianhe Airport, a major regional hub, and the first time AV routes in China have extended to an airport.<sup>56</sup> Another Chinese company, WeRide, recently received the first ever permit to operate an AV in the United Arab Emirates.<sup>57</sup> Many other Chinese companies are investing in AV technology and testing, including Huawei, Didi Chuxing, and Momenta. Further, these companies are attracting investment from other countries around the world.<sup>58</sup>

China's focus on advancement in this space should be alarming, as no American policymaker should want to see a world where China dominates the AV market. This scenario presents immense national security challenges and would also mean the United States would not see much of the job creation from a prosperous AV industry.

*European Union ("EU").* In August 2022, the European Commission issued the first EU-wide safety regulations for the automated driving systems of "fully automated" vehicles, enabling EU-wide approvals for commercial deployment of vehicles with these systems.<sup>59</sup> This marked the first multinational safety regulation for fully automated vehicles and provided added certainty to the AV industry but also a significant competitive advantage for the region.

*Japan.* Japan incorporated SAE Level 4 autonomous driving into its traffic law in April of this year.<sup>60</sup> This is the latest step in Japan's demonstrated support for AVs, following Japan's enactment of a Road Transport Vehicle law in 2020 recognizing AVs and establishing a related inspection regime and permit system.<sup>61</sup>

#### B. AVs and National Security

American leadership in the AV industry is also a matter of national security. Since before the days of the DARPA challenge, the Department of Defense ("DOD") has been interested in developing and deploying autonomous ground vehicles as tools on the battlefield and for logistics. Autonomous trucks could replace manned vehicles on dangerous convoy missions, allowing for greater flexibility in logistics without putting soldiers in harm's way,<sup>62</sup> while other AVs can augment existing assets and undertake high-risk frontline missions like reconnaissance.<sup>63</sup>

AVIA member Kodiak recently partnered with the DOD's Defense Innovation Unit as part of the Army's ongoing Robotic Combat Vehicle program.<sup>64</sup> This partnership connects Kodiak's AV expertise directly to DOD experts as they work to develop the next generation of combat vehicles. Congress included language in the House-passed fiscal year 2024 National Defense Authorization Act supporting the Robotic Combat

<sup>55</sup> Rebecca Bella, *Baidu, Pony.AI Win First Driverless Robotaxi Permits in China*, TECHCRUNCH (Apr. 27, 2022, 11:21 PM), <https://techcrunch.com/2022/04/27/baidu-pony-ai-win-first-driverless-robotaxi-permits-in-china/>.

<sup>56</sup> David Leggett, *Daidu First in China to Offer Driverless Airport Rides*, JUST AUTO (Aug. 31, 2023), <https://www.just-auto.com/news/baidu-first-in-china-to-offer-driverless-airport-rides/>.

<sup>57</sup> Rebecca Bellan, *China's WeRide Secures Self-driving Vehicle License from UAE*, TECHCRUNCH (July 4, 2023), <https://techcrunch.com/2023/07/04/chinas-weride-secures-self-driving-vehicle-license-from-uae/>.

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

<sup>59</sup> Commission Implementing Regulation 2022/1426 of Aug. 5 2022, Laying Down Rules for the Application of Regulation (EU) 2019/2144 of the European Parliament and of the Council as Regards Uniform Procedures and Technical Specifications for the Type-Approval of the Automated Driving System (ADS) of Fully Automated Vehicles, 2022 O.J. (L 221).

<sup>60</sup> Graham Hope, *Japan to Greenlight Self-Driving Vehicles in 2023*, IOT WORLD TODAY (November 3, 2022), <https://www.iotworldtoday.com/transportation-logistics/japan-to-greenlight-self-driving-vehicles-in-2023>.

<sup>61</sup> Kazuhiro Ogawa, *Japan Revamps Laws to put Self-driving Cars on Roads*, NIKKEI ASIA (Mar. 9, 2019), <https://asia.nikkei.com/Politics/Japan-revamps-laws-to-put-self-driving-cars-on-roads>.

<sup>62</sup> Maj. Brian Mathews, *Autonomous Vehicles: New Technology Revolutionizes Army's Principles of Sustainment*, U.S. ARMY (Aug. 31, 2022), <https://www.army.mil/article/259621/autonomous-vehicles-new-technology-revolutionizes-armys-principles-of-sustainment>.

<sup>63</sup> David Vergun, *DOD Adopting Commercial Technology to Control Unmanned Ground Vehicles*, DEPT. OF DEFENSE (Dec. 6, 2022), <https://www.defense.gov/News/News-Stories/Article/Article/3237210/dod-adopting-commercial-technology-to-control-unmanned-ground-vehicles/>.

<sup>64</sup> John Rosevear, *Self-driving Truck Startup Kodiak Robotics Wins \$50 Million Deal to Help Develop Driverless Army Vehicles*, CNBC (Dec. 6, 2022), <https://www.cnbc.com/2022/12/06/kodiak-wins-50m-deal-to-develop-driverless-army-vehicles.html>.

Vehicle program's leveraging of dual-use commercial ADS and pushing other branches to follow the Army's lead in autonomous software procurement.<sup>65</sup>

The future of these programs, and their potential to keep soldiers out of harm's way, depends on maintaining U.S. leadership in the AV industry. Preserving American leadership will keep the United States ahead of competitors while saving lives—both on distant battlefields and on highways here at home. Further, ensuring a robust U.S. AV industry and retaining a dynamic civilian AV industry can provide vital expertise and technology for military automation programs, while DOD funding can provide added support for civil AV development, creating a positive feedback loop that will help the long-term sustainability of the AV industry.

#### V. CONCLUSION

The further deployment of autonomous trucks and other AV technologies will vastly increase safety on our roadways and generating substantial job creation and supply chain benefits. However, to ensure those benefits are realized here in the United States, we must preserve American leadership in the AV industry. I thank the Subcommittee for its leadership on these important issues. AVIA looks forward to serving as a resource for technical and policy questions on this subject and working with you to make safe autonomous vehicles a reality for Americans nationwide.

Mr. CRAWFORD. Thank you, Mr. Farrah.

Mr. Spear, you are recognized for 5 minutes.

#### **TESTIMONY OF CHRIS SPEAR, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN TRUCKING ASSOCIATIONS**

Mr. SPEAR. Thank you, Chairman Crawford, Ranking Member Holmes Norton, full committee Ranking Member Larsen, and members of the subcommittee. I appreciate the opportunity to testify this morning on behalf of the American Trucking Associations.

This hearing coincides with National Truck Driver Appreciation Week, as you have already heard. It is an annual celebration honoring all 3.5 million professional truckdrivers for their service to our Nation's economy.

Each year, these heroes drive over 320 billion miles, that is equal to 13 million trips around the globe, delivering 12 billion tons of freight, now 72.5 percent of our goods. We celebrate these achievements this week as an important reminder of the critical role they play the other 51 weeks of the year.

Today's hearing examines the impact automated commercial vehicles will have on consumers, our supply chain, and the United States ability to remain a global innovator.

What is key to each is our industry's ability to safely and responsibly meet economic demand. We believe AVs are a critical piece to that equation, including their potential to assist drivers by improving their awareness and responsiveness.

You are all aware there is now a shortage of talent in most sectors of employment. Our industry is no exception. In fact, trucking has long battled the shortage of drivers and technicians largely due to four decades of unchanged Federal weight and length requirements and surging consumption, an aging workforce, barriers to entry for younger workers, an underrepresentation of women, and lifestyle preferences precluding many job seekers from considering long-haul trucking.

In 2022, the shortage of qualified drivers was at a near record level of 78,000. Projections show that our industry will need to hire

<sup>65</sup> National Defense Authorization Act for Fiscal Year 2024, H.R. 2670, 118 Cong. § 267 (2023), <https://www.congress.gov/bill/118th-congress/house-bill/2670/text/rds>.

1.2 million more drivers over the next decade just to keep pace with the economic demand and replenish an aging workforce.

In short, we need more drivers, and we needed them yesterday.

I stress this data as it underscores the challenges our industry faces to meet the needs of society, to avoid lags in the supply chain, and maintain the Nation's position as a world leader.

In short, there is plenty of room for innovation to help fill this gap without displacing drivers.

To the contrary, we see this technology as improving the essential job of truck driving by making it safer, more productive, and less stressful. We believe it is vital to attracting the next generation of talent into this profession.

What is needed first is a national framework that encourages development, testing, and deployment of technology in direct support of interstate commerce.

Federal guidance should treat commercial and passenger vehicles equally and require automated vehicles to achieve an acceptable level of safety and performance rather than requiring the use of specific technologies.

The ATA and its members commit to working with this subcommittee to help shape this framework, blending technological value with operational realities that reduce highway injuries and fatalities.

Levels 2 through 4 driver assist technologies are already producing safer operations of commercial and passenger vehicles, protecting truckdrivers and the motoring public through preventive means.

Our written testimony also underscores the importance of cybersecurity where ATA is working with Federal agencies and the law enforcement community to standardize protocols that safeguard the movement of freight.

Conversely, securing cargo and ensuring that movement of hazardous materials, livestock, and produce, particularly in extreme weather conditions, are all factors that will undoubtedly require a driver, superseding the values of automation.

Lastly, our Nation must continue to lead the world in innovation, not concede vital ground to competitors or foes who are actively developing and deploying integrated systems with domestically sourced chips and software.

A Federal performance-based framework will ensure that the United States is not relegated to the position of benchwarmer.

ATA starts with yes. We come here to this hearing with data, facts, and real-world experiences that help generate outcomes. Understanding and solving this issue won't happen if decisions rely on baseless rhetoric and emotion.

To that end, Mr. Chairman, I look forward to answering your questions.

[Mr. Spear's prepared statement follows:]

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**Prepared Statement of Chris Spear, President and Chief Executive Officer,  
American Trucking Associations**

INTRODUCTION:

Chairman Crawford, Ranking Member Holmes Norton, and Members of the Highways and Transit Subcommittee, I appreciate the opportunity to testify before you today on behalf of the American Trucking Associations (ATA).<sup>1</sup> ATA is a 90-year-old federation and the largest national trade organization representing the interests of the U.S. trucking industry, including the approximately 8.4 million men and women working in trucking-related jobs.<sup>2</sup> Our fifty-state federation encompasses 37,000 motor carriers as well as their corresponding suppliers. ATA represents every sector of the industry, from less-than-truckload to truckload, agriculture and livestock transporters to auto haulers and movers, and large motor carriers to mom-and-pop one-truck operations.

I'd like to begin my testimony by noting that today's hearing coincides with National Truck Driver Appreciation Week, an annual celebration honoring all professional truck drivers for their hard work and fortitude in tackling one of our economy's most demanding and essential jobs. Truck drivers are the unsung heroes of our supply chain, each year driving over 320 billion miles—the equivalent of nearly 13 million trips around the globe—to deliver roughly 12 billion tons of freight.<sup>3</sup> Every one of those miles represents a stocked store shelf, a package placed on a household doorstep, materials delivered to a manufacturer, and equipment conveyed to a construction site. These professional men and women deliver the goods we rely on safely, securely, and on time while serving as role models in their communities. Representing and supporting our nation's truck drivers is one of my highest honors as ATA President and CEO, and I am privileged to celebrate those men and women.

It is not lost on me that during the week that we honor our nation's truck drivers I am testifying about a technology that some fear may eliminate the role of the driver. However, we must realize that development of automated technology for vehicles does not mean that all vehicles will become "driverless vehicles" and that truck driving jobs will simply be eliminated. The reality is much more complex. Given the variety of freight movement—think about liquids, livestock, hazardous material, large construction equipment, and oversize loads—and the variety of road, terrain, and weather conditions throughout the country, there will continue to be a role and need for drivers as part of a logistics system that includes automated trucks. ATA believes that automated trucks will be a tool that will help improve the efficiency of freight movement and help address a shortage of drivers, not replace them. Driver responsibilities may adjust over time with deployment of automated technologies, but the industry continues to need drivers, our greatest asset.

It is both timely and important that the Highways and Transit Subcommittee holds today's hearing to consider the future of automated commercial motor vehicles, as well as their likely impact on society, the supply chain and U.S. economic leadership. This subcommittee knows well that trucking is the dynamic lynchpin of the U.S. economy. More than 80% of U.S. communities rely *exclusively* on trucking to meet their freight transportation needs, and trucking currently moves more than 70% of the nation's annual freight tonnage.<sup>4</sup> Over the next decade, trucks will be tasked with moving 2.4 billion more tons of freight than they do today, and trucks will continue to deliver the vast majority of goods to American communities.<sup>5</sup> It is no coincidence that an industry so essential to American productivity is at the forefront of such exciting innovation and ingenuity.

The COVID-19 pandemic opened Americans' eyes to the convenience and reliability of delivery, and as we emerge from the pandemic, Americans expect their goods to be delivered even faster, more cheaply, and more efficiently. Ongoing supply chain disruptions have exposed the need for greater flexibility to meet these new challenges. ATA believes automated driving systems (ADS) will significantly enhance the safety, efficiency, and productivity of the U.S. freight and logistics system and provide 21st century solutions to meet 21st century challenges.

The benefits of this technology are recognized globally, and the United States is now competing with other nations like China to assert dominance in this burgeoning

<sup>1</sup> The American Trucking Associations is the largest national trade association for the trucking industry. Through a federation of 50 affiliated state trucking associations and industry-related conferences and councils, ATA is the voice of the industry America depends on most to move our nation's freight.

<sup>2</sup> *American Trucking Trends 2023* American Trucking Associations (August 2023)

<sup>3</sup> *Ibid.*

<sup>4</sup> *U.S. Census Bureau Commodity Flow Survey*, U.S. Census Bureau, 2017.

<sup>5</sup> *Freight Transportation Forecast 2020 to 2031*, American Trucking Associations, 2020.

space. ATA encourages Congress and federal agencies to develop policies that will foster innovation and ensure that America does not fall behind its global competitors in the development of this important technology. The absence of a federal framework that encourages the development of 21st century solutions right here in the United States amounts to a competitive advantage for other nations.

The trucking industry has a substantial stake in the enhancements to road safety that automated and connected vehicle technology will provide. America's roads and bridges are truck drivers' workplace, and safety is of paramount importance. The safety gains achieved by removing human error—as well as the additional economic and societal benefits—are very enticing to an industry that already spends at least \$10 billion annually on safety, including technology enhancements, to help ensure that drivers and passengers of all vehicles make it safely to their destination.<sup>6</sup>

As the Transportation and Infrastructure Committee, which maintains jurisdiction over automated vehicle technologies in commercial motor vehicles, considers legislation to guide federal policy and regulations on autonomous vehicles (AVs), ATA encourages a multi-modal approach that prioritizes commercial motor vehicles, heavy specialty vehicles, trailer-combination vehicles, and passenger vehicles equally. We strongly recommend that any legislation establishing federal oversight of the development and deployment of AV technologies consider all road users, including passenger vehicles, commercial trucks, buses, as well as the supporting infrastructure. We stand ready to support and work hand-in-hand with you in that effort.

We thank and commend you for holding this important hearing today and welcome the opportunity to engage on this critical issue. National Truck Driver Appreciation Week is an annual reminder that we must continue to do more to support the hard-working individuals who drive this economy, and a federal framework that supports innovation will greatly improve safety, efficiency, and productivity on our nation's roadways, while strengthening our supply chains and ensuring the nation's long-term global economic competitiveness.

#### THE CURRENT STATE OF THE INDUSTRY:

Six years ago to the day, I testified before the Senate Committee on Commerce, Science and Transportation on this very issue and shared the trucking industry's perspective on how the deployment of automated trucks might play out.<sup>7</sup> That discussion focused on the potential safety benefits and the opportunities to improve the resiliency of our supply chain. I testified on timelines and relayed the difficulty of envisioning a future where driving jobs would be obsolete. Everyone agreed that safety was paramount, and I underscored that testing would follow deliberate and measured steps towards maturity. Since that hearing, we have seen the automated vehicle technology available for heavy-duty trucks and vehicles of all sizes grow by leaps and bounds to the cusp of commercialization. In the six years since my previous testimony, Congress has missed the opportunity to take a leadership role in overseeing the development and deployment of these technologies. But the opportunity is still at hand for the federal government's leadership role to now grow.

Our predictions from six years ago were accurate. Developers have built robust and safe testing programs across many different parts of the trucking industry. We see automated trucks in development for heavy-duty and medium-duty use, for highway and off-highway applications, and for public roads and private yards. These developments are data-driven and based on needs identified by industry for particular sectors and use cases. There has been no rush to deploy, no flood of driverless trucks on our highways, and no driving jobs lost. Along the way, these companies have been highly regulated and transparent, even by the high standards of our industry. They have submitted voluntary safety self-assessments that detail their processes in depth. They are subject to the National Highway Traffic Safety Administration's (NHTSA) Standing General Order (SGO) and report every incident involving their trucks for public view, regardless of who is at fault.<sup>8</sup> They have worked with ATA's Technology and Maintenance Council and the Commercial Vehicle Safety Alliance to build a robust inspection program and comply with inspections like every other truck on the road. They have been patiently working with industry partners to understand their needs and concerns. We have seen that automated trucks have not and will not show up everywhere all at once. The developers understand

<sup>6</sup>ATA Safety Investment Study, 2016, <http://www.trucking.org>

<sup>7</sup><https://www.commerce.senate.gov/2017/9/transportation-innovation-automated-trucks-and-our-nation-s-highways>

<sup>8</sup><https://www.nhtsa.gov/laws-regulations/standing-general-order-crash-reporting>.

the complexity and diversity of our industry and are carefully following the maturity of the technology.

The timing of this hearing is not a coincidence. We now have a much clearer view of what deployment might look like, and the need for federal leadership is more important than ever. Developers have identified specific over-the-road routes that meet the needs of industry partners, and they are testing their technology to maturity. These routes may be ready for deployment very soon, and federal leadership is vital for success and continued innovation. It is not enough for the federal government to just remove barriers to operation like outdated regulatory language. We need federal leadership to ensure that these vehicles can operate in interstate commerce without disruption. Automation has the potential to dramatically increase our nation's supply chain resiliency, but only if it can operate like other trucks on our roads. The risks of a patchwork of state or local requirements threaten to stifle the innovation before it even has a chance to prove its worth. Kneejerk reactions like AB 316 in California undermine not just the technology itself but our ability to imagine the future. Since I last testified on this topic, we all have had six more years of valuable experience, and the urgency of the moment demands that we move beyond the hype and alarmist predictions for automation in commercial vehicles.

In 2021 the U.S. Department of Transportation (DOT) estimated that adoption of automation in long-haul trucking would increase earnings across all workers, increase overall employment, and increase the US GDP.<sup>9</sup> The DOT did not find that there would be industry lay-offs except in the most aggressive case of adoption. We have an aging work force and an ongoing driver shortage in trucking. Clearly there is room for both drivers and automation to build a more efficient and resilient supply chain. The industry is ready for leadership, and Congress and the DOT can help us build that future.

#### RECENT FEDERAL REGULATORY AND LEGISLATIVE ACTIVITY:

In 2017, the U.S. House of Representatives passed the SELF DRIVE Act (H.R. 3388) unanimously, and later that fall, the AV START Act (S. 1885) did not advance beyond consideration by the Senate Commerce Committee. Despite the fact that efforts to enact federal legislation have stalled since 2017, the DOT has continued to use the tools at its disposal to exercise federal oversight and facilitate the safe testing and initial deployments of automated vehicles in the United States. These tools include guidance documents such as AV 4.0<sup>10</sup> (issued in 2020) and DOT's 2021 *Automated Vehicles Comprehensive Plan*<sup>11</sup>, which identify roles and responsibilities of the DOT and other stakeholders, and NHTSA's SGO<sup>12</sup> (issued in 2021), which ensures that DOT receives timely information on safety-related incidents involving ADS-equipped vehicles on public roads. Another DOT tool, the exemption process, provides a means for the Federal Motor Carrier Safety Administration (FMCSA) and NHTSA to evaluate and approve on a temporary basis alternative means to meet or exceed existing safety standards that were written with the implicit assumption of the presence of human drivers and traditional driver controls. Additionally, and importantly, NHTSA maintains its recall authority, which allows the Agency to recall vehicles or equipment that pose an unreasonable risk to safety even when there is no applicable Federal Motor Vehicle Safety Standard (FMVSS).<sup>13</sup> In the near term, these tools establish an initial pathway for testing and limited deployment of ADS-equipped vehicles to demonstrate their positive impact on vehicle safety, transportation system efficiency, and improved mobility for people and goods.

Longer term, as ADS technology matures, it will be necessary for DOT to modernize its regulations to reflect the capabilities of ADS and its integration into commercial vehicle operations. ATA commends FMCSA for seeking supplemental information for its rulemaking on the *Safe Integration of Automated Driving Systems-Equipped Commercial Motor Vehicles*<sup>14</sup> earlier this year, and we look forward to working with FMCSA as the Agency moves forward with this rulemaking. Likewise, ATA commends NHTSA for the recently announced plans to issue an NPRM this fall for the *ADS-equipped Vehicle Safety, Transparency and Evaluation Program (AV*

<sup>9</sup> <https://rosap.nhtsa.gov/view/dot/54596>

<sup>10</sup> <https://www.transportation.gov/policy-initiatives/automated-vehicles/av-40>.

<sup>11</sup> <https://www.transportation.gov/av/avcp>.

<sup>12</sup> <https://www.nhtsa.gov/laws-regulations/standing-general-order-crash-reporting>.

<sup>13</sup> Understanding NHTSA's Regulatory Tools, DOT HS 808 795, Revised August 2017, page 2. Available at: [https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/understanding\\_nhtsas\\_current\\_regulatory\\_tools-tag.pdf](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/understanding_nhtsas_current_regulatory_tools-tag.pdf) (accessed September 7, 2023).

<sup>14</sup> <https://www.federalregister.gov/documents/2023/02/01/2023-02073/safe-integration-of-automated-driving-systems-ads-equipped-commercial-motor-vehicles-cmvs>.

*STEP*) among other ADS-related rulemaking initiatives.<sup>15</sup> The overall goal for DOT should be to develop a set of regulations that remove unnecessary barriers created by existing rules that did not envision automated driving, while establishing a clear regulatory baseline for companies developing or deploying automated vehicles. An updated federal regulatory framework that reflects the difference between human operators and ADS is critical to preserving a seamless set of safety standards across the country that provides assurance to the public and certainty to companies developing and deploying automated vehicles.

Beyond the federal regulatory action being undertaken at DOT, we are aware that Congress is again considering legislative action as well. We commend those efforts and would urge the Transportation and Infrastructure Committee to take part in those discussions and negotiations to ensure that automated commercial motor vehicles are a part of that dialogue.

#### AUTOMATED DRIVING TECHNOLOGY STRENGTHENS HIGHWAY SAFETY:

The trucking industry has a substantial stake in the success of safe automated and connected vehicle technology. America's roads and bridges are truck drivers' workplace. Safety is not just a slogan; it is of paramount importance. There were 13.9 million medium and heavy-duty trucks registered in the U.S. in 2021, including 4.07 million Class 8 trucks.<sup>16</sup> That same year, medium- and heavy-duty trucks accounted for approximately 10.4% of the vehicle miles traveled.<sup>17</sup> Since deregulation in 1980, both the number of fatal truck crashes and rate of fatalities have declined.<sup>18</sup> However, ATA does acknowledge a recent up-tick in fatal crashes. While there are several factors that have contributed to this, including the overall majority of truck-related crashes being the fault of the passenger vehicle,<sup>19</sup> automated vehicle technology has the potential to decrease fatal crashes.

Safety gains are achievable by removing human error, which is a factor in 87% of large truck crashes<sup>20</sup> and 94% of all vehicle crashes.<sup>21</sup> The additional economic and societal benefits, are very enticing to an industry that—as mentioned previously—already spends at least \$10 billion annually on safety. These investments include deployment of safety technology enhancements that go above and beyond what is mandated by federal regulations. Automated and connected vehicle technology can work together to further reduce or even eliminate these crashes. With these innovations, improvements in safety are only the beginning; we can also make meaningful advances in other important policy areas like reducing traffic congestion and emissions nationwide.

Automated driving systems are the next step in the evolution of currently available safety technologies, and it is critical that federal policies developed for these advances consider *all vehicles* operating on our nation's roadways. These improvements will not be one-size-fits-all technologies, but rather will offer layers of driver assistance that, in some cases, include full automation. While opponents of this safety technology will often refer to it in a negative light, we need to think beyond anecdotes and fearmongering and collect data on the benefits of avoiding accidents, reducing crash severity, mitigating congestion, and improving air quality. Quantifiable factors must guide policy and drive outcomes. Far too often, when we reach barriers in the development of this safety technology, opponents will cite those barriers as a reason for why we should not have automated vehicle technologies rather than engaging in conversations with stakeholders as to how we can *overcome* these barriers and advance these meaningful and lifesaving efforts. Holding innovation hostage under the guise of safety considerations is an outdated, performative approach that may appease interest groups but certainly does not advance our common goal of zero highway fatalities. ATA is not the association of "NO" and will always stand committed to work with any and all stakeholders in these discussions.

<sup>15</sup> <https://www.nhtsa.gov/speeches-presentations/automated-road-transportation-symposium-arts23-keynote-address> (accessed September 7, 2023).

<sup>16</sup> S&P Global, *U.S. Freight Transportation Forecast* (2023)

<sup>17</sup> Federal Highway Administration, Highway Statistics, 2021, Table VM-1, accessed online at <https://www.fhwa.dot.gov/policyinformation/statistics/2021/pdf/vm1.pdf>.

<sup>18</sup> Large Truck and Bus Crash Facts 2020, Trends Chapter, Table 4, page 7, Federal Motor Carrier Safety Administration, Washington, D.C. [https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/2022-10/LTBCF%202020-v5\\_FINAL-09-20-2022%20508%2010-3.pdf](https://www.fmcsa.dot.gov/sites/fmcsa.dot.gov/files/2022-10/LTBCF%202020-v5_FINAL-09-20-2022%20508%2010-3.pdf).

<sup>19</sup> *Financial Responsibility Requirements for Commercial Motor Vehicles, U.S. Department of Transportation, Federal Motor Carrier Safety Administration, January 2013*, page xii, footnote 2.

<sup>20</sup> Large Truck Crash Causation Study, Federal Highway Administration, July 2007

<sup>21</sup> Singh, S. (2015, February). Critical reasons for crashes investigated in the National Motor Vehicle Crash Causation Survey. (Traffic Safety Facts Crash Stats. Report No. DOT HS 812 115). Washington, DC: National Highway Traffic Safety Administration.

## AUTOMATED DRIVING TECHNOLOGY AND ADDRESSING CYBERSECURITY:

As automated vehicle technologies have advanced for both passenger and commercial motor vehicles, some have expressed concerns that the shift to autonomy may pose significant cybersecurity risks. Just as automated driving technology has the potential to bring safety benefits to the motoring public, steps must be taken to ensure that deployment of these technologies do not create vulnerabilities as a result of cybersecurity threats. As with many things in life, including the threat against passenger vehicles, cybersecurity is an important consideration for commercial vehicles.

At an early stage, ATA recognized these threats and has already taken steps to help ensure a robust cybersecurity environment for motor carriers. For instance, in conjunction with ATA's Technology and Maintenance Council (TMC) and Transportation Security Council (TSC) we have developed the *Fleet CyWatch* program.<sup>22</sup> *Fleet CyWatch* assists ATA fleet members in assessing their cybersecurity maturity and shares information with fleets about cyber-threats that may impact their operations. *Fleet CyWatch* coordinates private and federal efforts to provide motor carriers with information and recommendations in the areas of cybersecurity awareness, prevention, and mitigation methods. These efforts compliment industry best practices produced by the Auto-ISAC (Automotive Information Sharing and Analysis Center) with the common objective to demonstrate the industry's proactive collaboration to protect consumer safety through vehicle cybersecurity.<sup>23</sup>

Additionally, TMC's Fleet Maintenance Management Study group has taken an industry leadership role pertaining to various aspects of cybersecurity through its Cybersecurity Task Force. Among other goals, the Task Force's mission includes addressing cybersecurity issues and how they can be dealt with when they occur, and more importantly, preventing attacks from occurring in the first place. This task force focuses on creating recommended practices combined with research from other expert sources, such as the National Science Foundation, U.S. Department of Homeland Security, DOT, Federal Bureau of Investigation, National Motor Freight Traffic Association, and the Society of Automotive Engineers.

Since its inception, the Task Force, in concert with other TMC task forces and committees, has developed multiple recommended practices (RPs) related to cybersecurity efforts. For example, the task force produced an RP titled *Cybersecurity Insurance Guidelines* that offers guidelines for cybersecurity awareness, prevention, and risk mitigation through insurance for commercial motor vehicles weighing more than 10,001 pounds. The guidelines also list resources that fleet managers can use for managing cybersecurity risk. TMC continues to raise awareness of the importance of cybersecurity among fleet managers and service technicians by incorporating efforts into its annual National Technician Skills Competition which is designed to challenge top industry technicians' knowledge and awareness of critical issues that these frontline personnel can positively impact through maintenance operations.<sup>24</sup> TMC's cybersecurity efforts will play an integral part in highway safety today and into the future.

In addition to these steps, ATA's leadership has also implemented a monthly dialogue with the Transportation Security Administration (TSA) to share information and resources and discuss the protocols and standards being developed to improve cybersecurity. TSA has expressed a willingness to collaborate with, and even train, ATA staff and the trucking industry on cybersecurity best practices. The trucking industry and government working hand-in-hand to address and prevent potential threats is a significant step towards enhancing cybersecurity efforts.

These actions show just how serious the trucking industry is taking the potential threat of cyberattacks, as well as the significant steps that we are taking to mitigate and prevent these risks. As the shift to autonomy continues, the trucking industry will remain ever vigilant of cybersecurity risks and threats.

## AUTOMATED DRIVING TECHNOLOGY SUPPORTS THE TRUCKING WORKFORCE:

The trucking industry, the backbone of our nation's economy and supply chain, continues to face a significant driver shortage. In 2022, the shortage of qualified drivers was at a near-record level of 78,000.<sup>25</sup> Recent events have not helped; the

<sup>22</sup> <https://www.trucking.org/fleet-cywatch>.

<sup>23</sup> <https://automotiveisac.com/best-practices/>.

<sup>24</sup> <https://tmc.trucking.org/TMC-Fall-Meeting>.

<sup>25</sup> *ATA Driver Shortage Update 2022*. American Trucking Associations, October 25, 2022. Available online at: [https://ata.msgfocus.com/files/amf\\_highroad\\_solution/project\\_2358/ATA\\_Driver\\_Shortage\\_Report\\_2022\\_Executive\\_Summary.October22.pdf](https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_Driver_Shortage_Report_2022_Executive_Summary.October22.pdf) (accessed September 1, 2023).



closure of a large, less-than-truckload motor carrier contributed significantly to the decreased employment of 37,000 in the truck transportation sector.<sup>26</sup> Many who lost jobs due to this closure will find jobs with new employers due to the demand for their skills. However, in the near term, this closure will exacerbate the shortage. Even before this closure, we projected that the shortage would increase to 160,000 by 2031.<sup>27</sup> Furthermore, the trucking industry must hire roughly 1.2 million new drivers over the next decade to both keep pace with growing demand and replenish an aging workforce.<sup>28</sup> Our nation needs drivers, and we need them yesterday.

Technologies that empower drivers to be more productive help alleviate the driver shortage. Contrary to the unfounded alarmist fears propagated by some opposing interest groups, these technological advances will enhance safety and improve drivers' lives. Improving drivers' lives makes the occupation more desirable, enabling more drivers to stay in the industry and attracting new drivers.

A current debate in the California legislature is the result of some pushing the notion that autonomous vehicles will result in fewer jobs and less safety.<sup>29</sup> Labor leaders are attempting to pass legislation that would ban autonomous trucks over 10,000 lbs in that state.<sup>30</sup> Governor Newsom's administration is wisely pushing back to prevent damage to the state's culture of innovation while ensuring state agencies can perform their duties of protecting public safety.<sup>31</sup>

Fears that all commercial driving jobs will be eliminated and that individuals will be left out of work are overblown and unsubstantiated.<sup>32</sup> If a future exists in which these jobs are all handled by autonomous vehicles, it is too far away to see. As mentioned earlier in my testimony, a recent 2021 DOT study showed that the adoption of automation in long haul trucking would not only increase earnings across all workers and increase the US GDP but would also increase employment.<sup>33</sup> Today, the issue is increasing all levels of automated technology to improve safety and productivity. To increase the availability and accessibility of such technology, testing

<sup>26</sup>“Transportation and warehousing lost 34,000 jobs in August. Employment in truck transportation fell sharply (–37,000), largely reflecting a business closure. Couriers and messengers lost 9,000 jobs, while air transportation added 3,000 jobs. Employment in transportation and warehousing had shown little net change over the prior 12 months.” *Employment Situation Summary, August 2023*, U.S. Department of Labor, Bureau of Labor Statistics, September 1, 2023. Available online at: <https://www.bls.gov/news.release/empstat.nr0.htm> (accessed September 1, 2023).

<sup>27</sup>*ATA Driver Shortage Update 2022*.

<sup>28</sup>*Ibid.*

<sup>29</sup>Sean M. O'Brien, the Teamsters general president recently stated, “the Newsom administration is catering to Big Tech when it should be protecting good-paying jobs and keeping Californians safe from roadside tragedy.” *TEAMSTERS CALL ON GOV. NEWSOM TO PUT SAFETY BEFORE BIG TECH BY SUPPORTING AB 316*, Teamsters.org, August 29, 2023. Available online at: <https://teamster.org/2023/08/teamsters-call-on-gov-newsom-to-put-safety-before-big-tech-by-supporting-autonomous-vehicle-bill-ab-316/> (accessed September 1, 2023).

<sup>30</sup>The Teamsters Union and the California Labor Federation are sponsoring legislation to require a human operator on driverless big rigs to ensure safety and prevent job loss.” *California Labor Opposes Expansion of Driverless Vehicles*, California Labor Federation, August 11, 2022. Available online at: <https://calaborfed.org/letter-to-california-puc-re-autonomous-vehicles/> (accessed September 1, 2023).

<sup>31</sup>“Since 2012, California has undergone a long and thoughtful regulatory process to permit autonomous passenger vehicles and other light-duty vehicles, and the state is currently developing its permitting framework for autonomous heavy-duty trucks. Despite this history of careful and fact-based public policy, AB 316 circumvents the process and effectively bans heavy duty autonomous trucks without safety drivers in California. And it runs counter to our state's business climate, where thoughtful policy, innovative ideas and an inclusive culture combine to fuel the creation of new industries, while protecting public safety.” Letter from Dee Dee Myers, Senior Advisor to the Governor and Director, Governor's Office of Business and Economic Development, to Assemblymember Cecilia Aguiar-Curry, August 15, 2023. Available online at: <https://www.politico.com/f/?id=0000018a-1e52-d2a3-a3fe-fffaa3a20000> (accessed September 1, 2023).

<sup>32</sup>“Our model indicates that the adoption of driving automation will bring direct productivity enhancements to the long-haul trucking sector and (due to transportation's central role in the economy) produce secondary productivity enhancements to the larger macroeconomy. These productivity enhancements will increase GDP, capital, employment, wages, and welfare that can be monetized into billions of dollars. Additionally, our model concluded that these economic benefits can likely be reaped without mass lay-offs of long-haul truck drivers.” Waschik, Robert *et al.*, *Macroeconomic Impacts of Automated Driving Systems in Long-Haul Trucking*, U.S. Department of Transportation, Office of the Assistant Secretary for Research and Technology, Intelligent Transportation Systems Joint Program Office, 2021, at p. 35. Available online at: <https://rosap.ntl.bts.gov/view/dot/54596> (accessed September 1, 2023). See also, *Autonomous long-haul trucking stands to grow the Golden State's economy while creating jobs and raising wages without mass driver layoffs*, Silicon Valley Leadership Group Foundation, April 13, 2022. Available online at: <https://www.svl.org/study-shows-autonomous-trucking-will-grow-californias-economy/> (accessed September 1, 2023).

<sup>33</sup><https://rosap.ntl.bts.gov/view/dot/54596>

must be undertaken safely and responsibly. Policymakers should not ignore the positive impact it will have on workers and society by reflexively banning the testing and implementation of technology because, at some point in the distant future, it could change the nature of work for some individuals.

As technology increases productivity, this may mean that fewer individuals are needed to perform the same work. While ATA believes that the increase in productivity provided by automated trucks will help address the driver shortage in the face of increasing demand for freight transportation by truck,<sup>34</sup> we do not dismiss the importance of considering the potential impacts on the workforce and the need to develop programs that will help prepare workers with the skills needed for the jobs of the future.

The integration of automated driving systems in trucking could lower freight transportation costs and enhance productivity, leading to greater economic activity and job creation in the transportation and logistics industries as well as other business sectors.<sup>35</sup> This would require some individuals to acquire new skills, and provides an opportunity for Congress to support the industry as we embrace these innovations. Ensuring that job training programs and federal workforce development dollars are targeted to support our workers as they adjust to a changing workplace will help prepare workers with the new and marketable skills needed for the jobs of the future.

The trucking industry's best asset is our incredible workforce. ATA is committed to developing that workforce, bringing unique individuals into great family-sustaining careers<sup>36</sup>, and helping existing individuals in the industry gain and increase the skills they need to succeed. As the U.S. unemployment rate is near historic lows,<sup>37</sup> we know that our industry must be employers of choice to recruit the next generation. To that end, the industry is focused on bettering the lives of its workforce. Technology has a substantial role to play here, and our industry is moving ahead to enhance safety and productivity, leading to benefits for all.

#### AUTOMATED DRIVING TECHNOLOGY AND THE SUPPLY CHAIN/ GLOBAL COMPETITIVENESS:

ATA encourages Congress and federal agencies to develop policies that will foster innovation and ensure that America does not fall behind its global competitors in the development of this important technology. AVs and ADS deployment have the potential to significantly enhance the safety, efficiency, and productivity of the U.S. freight and logistics systems. We have an opportunity to ensure that the technologies and vehicles that generate those benefits are developed, improved, implemented, and sold around the world by American companies.

Core technologies that will drive autonomous vehicle development and deployment—LIDAR (light detection and ranging), programming, machine learning, and artificial intelligence—should be emphasized by federal agencies so that America leads in the development of connected and automated heavy-duty trucking technology. As noted by the Congressional Research Service in a 2021 report, the pace of commercialization for autonomous technologies has slowed in reaction to accidents involving autonomous technology in passenger vehicles, but this has not stopped the accelerating development of advanced technologies that will improve vehicle performance, efficiency, and safety.<sup>38</sup> Establishing a federal framework for

<sup>34</sup>Freight Transportation Forecast 2020 to 2031, American Trucking Associations, 2020.

<sup>35</sup>"New jobs will be created. Driving automation systems would be expected to lower freight transportation costs and enhance productivity, leading to greater economic activity and job creation in the transportation and logistics industries, and other business sectors. Just as many employees today work in occupations that were unknown to prior generations—such as unmanned aerial systems, vehicle cybersecurity, or micromobility—future workers may choose from a wider variety of jobs that emerge from technology improvements, including driving automation." *Driving Automation Systems in Long-Haul Trucking and Bus Transit: Preliminary Analysis of Potential Workforce Impacts*, DOT Report to Congress, January 2021, page 10. Available online at: <https://www.transportation.gov/sites/dot.gov/files/2021-01/Driving%20Automation%20Systems%20in%20Long%20Haul%20Trucking%20and%20Bus%20Transit%20Preliminary%20Analysis%20of%20Potential%20Workforce%20Impacts.pdf> (accessed September 7, 2023).

<sup>36</sup>According to ATA's 2021 industry survey, the median pay for a truckload driver is \$69,687 per year, not including benefits. This represents an 18% increase from 2019. *2022 ATA Driver Compensation Study Advanced Executive Summary*. American Trucking Associations, June 30, 2022. Available online at: [https://ata.msgfocus.com/files/amf\\_highroad\\_solution/project\\_2358/ATA\\_2022\\_Driver\\_Compensation\\_Study\\_-\\_Press\\_Executive\\_Summary.pdf](https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_2022_Driver_Compensation_Study_-_Press_Executive_Summary.pdf) (accessed September 1, 2023).

<sup>37</sup>The current U.S. unemployment rate as reported by the U.S. Department of Labor's Bureau of Labor Statistics is 3.8 percent. *Employment Situation Summary, August 2023*.

<sup>38</sup>Congressional Research Service. Report R45985, "Issues in Autonomous Vehicle Testing and Deployment." 23 April 2021. <https://crsreports.congress.gov/product/pdf/R/R45985>.

testing and deployment of vehicles with advanced sensors, machine learning algorithms, and real-time data processing capabilities will ensure that we do not fall behind and forfeit our global dominance in innovation. It is also important to remember that autonomous vehicles and these core technologies can also be used to support military applications, protecting our service men and women on the job while they protect our country.<sup>39</sup>

As local, state, and federal agencies seek to achieve policy goals such as reducing emissions and strengthening supply chain resilience, we are also seeing a need for increased investment in autonomous technologies to support these goals. New zero-emission yard tractors at a terminal at the Port of Long Beach in California, which will be required to be operated by humans, will operate alongside over 100 automated vehicles and 70 driverless container-stacking cranes at the most automated port terminal in the U.S.<sup>40</sup> However, these investments in automation are lamentably rare in the U.S. where only four of 360 commercial ports have at least semi-automated terminals,<sup>41</sup> and those terminals still rank relatively low for efficiency among their global peers according to the 2023 Container Port Performance Index.<sup>42</sup> We all saw firsthand as we emerged from the pandemic that less efficient cargo handling at ports led to idling trucks outside of marine port terminals, delayed deliveries of goods, and empty store shelves. With those impacts in mind, it is important for Congress to step in and lay out a framework that will enable the testing and deployment of autonomous vehicles where appropriate to increase our supply chain efficiency and resilience.

Technologies in development here in the U.S. can be adapted and deployed to ensure the safe operation of new, clean trucks with tangible benefits to safety and the environment. Autonomous trucks can ensure the continuous flow of goods by leveraging real time data and the potential 24/7 availability for equipment. Additional benefits can be found in minimizing the energy consumption of heavy-duty trucks and trailers through platooning, route optimization that minimizes idling time in traffic jams or at facilities to load and unload cargo, and split-second responsiveness in real-time traffic conditions. These are technologies that should be explored with a mind towards improving the safety and traveling experience of all road users, making supply chains more efficient and reducing the environmental footprint of freight transportation.

The United States has a unique opportunity to establish itself as a global leader in AV technology, leveraging its technological prowess, research capabilities, and skilled workforce. ATA looks forward to working with congressional leaders, federal agencies, and industry stakeholders to ensure that, as AVs become an integral part of the transportation landscape, they not only drive economic growth but also contribute to a more sustainable and resilient future.

#### THE NEED FOR A FEDERAL FRAMEWORK:

While DOT continues its work to establish a regulatory framework to support the testing and deployment of automated commercial and passenger vehicles on U.S. roadways, it is important that Congress support these efforts or, at a minimum, not harm or impair the industry's ongoing efforts to advance AV technology and our continued work and collaboration in the regulatory arena. A clear path to deployment will provide the certainty needed for all stakeholders to continue their efforts to bring the benefits of automated vehicles to the U.S. transportation and logistics systems. As Congress considers legislative action to support automated vehicle technology, ATA encourages Congress to adopt a multi-modal approach and prioritize commercial motor vehicles, heavy specialty vehicles, trailer-combination vehicles, and passenger vehicles equally. We strongly recommend that any legislation establishing federal oversight of the development and deployment of AV technologies consider *all road users*, including passenger vehicles, commercial trucks, and commer-

<sup>39</sup> *Autonomous Vehicles: New Technology Revolutionizes Army's Principles of Sustainment*, August 31, 2022. Available at: [https://www.army.mil/article/259621/autonomous\\_vehicles\\_new\\_technology\\_revolutionizes\\_armys\\_principles\\_of\\_sustainment](https://www.army.mil/article/259621/autonomous_vehicles_new_technology_revolutionizes_armys_principles_of_sustainment) (accessed September 7, 2023)

<sup>40</sup> Reuters. "Focus: Jobs at stake as California port terminal upgrades to green technology." Lisa Baertlein, 8 June 2023. <https://www.reuters.com/sustainability/jobs-stake-california-port-terminal-upgrades-green-technology-2023-06-08/>.

<sup>41</sup> APM Research Lab, "Why does the U.S. lag other nations so badly in the automation of its ports? (And is that good or bad?)." Emily Schmidt, 3 November 2022. <https://www.apmresearchlab.org/10x-port-automation>.

<sup>42</sup> World Bank Group, Transport Global Practice. "The Container Port Performance Index 2021." 24 May 2022. <https://thedocs.worldbank.org/en/doc/66e3aa5c3be4647add01845ce353992-0190062022/original/Container-Port-Performance-Index-2021.pdf>

cial buses, as well as surrounding infrastructure. Doing so will provide all road users a seat at the table to ensure that the development of AV technologies is done safely. To that end, ATA offers the following guiding principles to promote the expeditious and safe deployment of AV trucks in the U.S.:

1. *The federal government should take a leading role in setting policies that will help foster the nationwide deployment of AV technologies in trucking.* The trucking industry relies on interstate highways to facilitate the free flow of goods between states. Accordingly, it is important that state and local laws do not inadvertently create disparities that slow the adoption of these safety- and productivity-boosting technologies. A clear process and standards-setting role for the federal government that preempts state efforts to regulate vehicle design is critical for commercial AV development.
2. *The federal government's approach should follow technological maturity and industry best practices.* AV technology in trucking is developing rapidly—and demonstrations continue to show the promise of enhanced safety and efficiency benefits. Congress and DOT should work with ATA, including ATA's Technology and Maintenance Council, and other trucking industry representatives to incorporate industry best practices when developing guidance and regulations for ADS-equipped commercial motor vehicles. Industry best practices provide a vital technical basis to assist the evolution of legislative and/or regulatory frameworks.
3. *The federal government should collaborate with industry to create performance-based standards that focus on objective testing and evaluation criteria for autonomous vehicles.* Requiring AVs to achieve an acceptable level of safety and performance, rather than requiring the use of specific technology, will focus regulations on risk management within specific operating environments. Government-industry interactions through the Voluntary Safety Self-Assessment (VSSA) process, the AV TEST Initiative, and the anticipated AV STEP program provide DOT with information on a variety of approaches to ADS technology and operations from a cross-section of organizations testing ADS-equipped vehicles. This information will help DOT, Congress, and other agencies develop policies, regulations, and/or guidance without inadvertently picking technological or operational winners or losers.

In the absence of a federal legislative framework, regulatory efforts related to AV technologies must ensure that they do not stymie meaningful progress in development, testing, and deployment. Should Congress choose to pass legislation, we recommend that those efforts do not hinder private sector innovation.

#### CONCLUSION:

In closing, I am grateful for the opportunity to testify before the Highways and Transit Subcommittee today on behalf of the American Trucking Associations and the motor carriers, suppliers, developers, and approximately 8.4 million men and women in trucking-related jobs that ATA represents. AV technology offers the trucking industry boundless potential for improvements to road safety, improvements to workforce recruitment and retention, reductions in congestion and emissions, and advancements in productivity. Deployment and adoption of these technologies will serve to strengthen supply chains and ensure the U.S. remains a global leader in technology and innovation.

While some have raised concern about the impacts that automated vehicle technologies will have on the future of work for truck drivers, I would reemphasize that our drivers are the trucking industry's best and most cherished asset. As we recognize and celebrate National Truck Driver Appreciation Week this week, we should consider how automated vehicle technologies can improve safety, operations, and productivity for those amazing men and women who will continue to play a critical and necessary role in our supply chain.

As the Transportation and Infrastructure Committee and Congress consider and debate a legislative federal framework for the development and deployment of automated vehicle technologies, those efforts should take a multi-modal approach to include all road users—both passenger as well as commercial motor vehicles—and the supporting infrastructure. Congress should evaluate the benefits of connected and automated technology on public safety and the economy and review regulations to take advantage of the capabilities provided by these new innovations. Implementing a seamless set of guidelines and safety standards nationwide will minimize any disruption and support the development of exciting and beneficial new technologies.

As the COVID-19 pandemic and supply chain challenges of recent years reminded the nation, trucking plays the most critical role in our economy. It keeps the shelves

of our local supermarkets fully stocked, gets life-saving medical supplies to hospitals and clinics, and delivers goods at every stage of production to communities across our country. The trucking industry should not be left out of any legislation that supports innovation in automated vehicle technology.

As you endeavor in these efforts, I, and the members of the American Trucking Associations, stand ready to support and work hand-in-hand with you. Thank you again, Chairman Crawford, Ranking Member Holmes Norton, and Members of this distinguished Subcommittee. I appreciate the opportunity and look forward to your questions.

Mr. CRAWFORD. Thank you, Mr. Spear.

Ms. Chase, you are recognized for 5 minutes.

[Pause.]

Mr. CRAWFORD. Can you get your microphone, please?

**TESTIMONY OF CATHERINE CHASE, PRESIDENT, ADVOCATES  
FOR HIGHWAY AND AUTO SAFETY**

Ms. CHASE. Good morning, Chair Crawford, Ranking Member Norton, Ranking Member Larsen, and subcommittee members. I am Cathy Chase, president of Advocates for Highway and Auto Safety.

Advocates is a national coalition of leading property and casualty insurance companies and agents and public health consumer law enforcement and safety groups working together since 1989 to prevent crashes, save lives, and reduce economic costs.

Thank you for holding today's hearing at a critical time when motor vehicle crash fatalities are at historic highs. Nearly 43,000 people were killed and 2.5 million more were injured in 2021. Fatal truck crashes have also been on the rise, increasing by 71 percent since 2009.

These are not just statistics. They are family members and friends who have needlessly died or been seriously injured in a preventable truck crash [indicating Advocates' "2023 Roadmap to Safety"].

Many are joining us today, in person or virtually. I want to thank them for their strength and determination to advance commonsense and cost-effective solutions to prevent truck crashes.

Also, I want to acknowledge National Truck Driver Appreciation Week and convey my gratitude for their essential contributions to our everyday lives.

Truck driving is one of the most dangerous jobs in our country, and drivers are at risk every time they get behind the wheel.

Automated or driverless technology, including cars, trucks, and buses, is being offered as a solution to reduce our Nation's mounting death and injury toll.

However, this remedy cannot be realized without rigorous testing, effective regulation setting minimum performance standards, comprehensive data collection, full transparency to inform regulators and the public, diligent Government oversight, and AV industry accountability to immediately identify problems and take corrective actions.

In other words, we need to know what is happening on our roads, and we need to make them safe.

AV safety performance and reliability are largely unknown, unresolved, and frequently unpredictable. What we do know is that AV operations in San Francisco have caused numerous dangerous situ-

ations. City officials, emergency responders, and local transportation leaders have raised serious safety concerns and strongly opposed the recent program expansion.

The safety mishaps are substantial and the consequences are alarming. A recent crash involving an AV and a firetruck and other incidents resulted in the State's regulatory agency cutting certain AV operations by 50 percent.

While AVs for passengers and AV trucks are not the same, there are similarities and lessons to be learned from the ongoing San Francisco program.

The serious problems must not be replicated or magnified with trucks or transit vehicles, which are significantly larger and heavier, more complex to operate, and can have devastating outcomes and crashes.

It is really no surprise that the public has serious concerns about AVs. Advocates commissioned a national public opinion poll earlier this year. It revealed that nearly 9 in 10 people are concerned about sharing the roads with driverless trucks.

When asked if their concerns about driverless vehicles would be addressed if required to meet minimum Government standards, 64 percent responded yes.

In 2020, Advocates, together with key stakeholders, developed the AV Tenets to guide the development of policies concerning the introduction and operation of AVs. More than 65 groups representing truckdrivers, unions, disability rights, emergency responders, law enforcement, bicyclists, pedestrians, smart growth and others, support the tenets.

They offer a blueprint to achieve essential goals. One, to prioritize the safety of all road users. Two, to guarantee accessibility and equity for all individuals, including those with disabilities. Three, to preserve consumer and worker rights. And four, to ensure local control and sustainable transportation.

Furthermore, the safe development and deployment of driverless trucks requires issuing Federal performance standards and other necessary regulations; reporting crashes involving fatalities, injuries, and property damage; rejecting mass exemptions from Federal safety standards; collecting data and making it publicly available; requiring driverless trucks to always have an operator with a valid CD in the vehicle for the foreseeable future and requiring other necessary endorsements; and obtaining additional operating authority for motor carriers with driverless trucks.

As AV trucks progress, many proven safety solutions that can dramatically reduce truck crash injuries now are currently available and need to be implemented. For example, the Bipartisan Infrastructure Law included a mandate for automatic emergency trucks [sic] within 2 years. Moreover, these are the building blocks for the possibility of future AV cars and trucks.

In closing, advancing safety, achieving technological innovation, and attaining economic leadership can and must be compatible goals and not tradeoffs.

Thank you.

[Ms. Chase's prepared statement follows:]

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**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 have been at the forefront of furthering proven and lifesaving technologies to prevent crashes and reduce the motor vehicle crash fatality and injury toll since our inception in 1989. Automated, or autonomous, vehicles (AVs) and automated commercial motor vehicles (ACMVs) may be able to contribute to this goal. However, this outcome cannot be achieved in the absence of effective regulations setting minimum performance standards, as well as thorough transparency, strong government oversight, and AV and ACMV industry accountability.

Currently there are no federal performance standards for advanced driver assistance systems (ADAS), partial automation convenience features, AVs, or ACMVs. ADAS include safety features presently offered in some cars and trucks such as automatic emergency braking (AEB), lane departure warning (LDW) and blind spot detection (BSD). The highly respected Insurance Institute for Highway Safety (IIHS) has found real-world significant crash rate reductions in vehicles equipped with these technologies. For many years, Advocates has been supporting legislation in Congress and regulatory actions by the U.S. Department of Transportation (DOT) to require proven safety technologies as standard equipment in all new vehicles.

Conversely, partial automation convenience features, such as adaptive cruise control (ACC) and lane centering used together, have not been proven to improve vehicle safety. According to IIHS President David Harkey, “[T]here is no evidence that [partial automation systems] make driving safer . . . In fact, the opposite may be the case if systems lack adequate safeguards.”<sup>1</sup> Misuse of and overreliance on some technologies already have led to numerous fatal crashes.<sup>2</sup>

In contrast to ADAS and partial automation convenience features, AVs and ACMVs are not available for consumer purchase at this time. However, testing has been increasing in recent years throughout the country, and operations of so-called robotaxis are allowed in a few cities including San Francisco with a recently approved expansion of their deployment approved by the California Public Utilities Commission (CPUC).<sup>3</sup> However, soon after the expansion was approved, a crash with a fire truck and other incidents that jeopardized public safety resulted in a swift order by the CPUC to reduce the robotaxi fleet while the California Department of Motor Vehicles conducts an investigation.<sup>4</sup> Additionally, the San Francisco Board of Supervisors announced their intention to petition the CPUC for a reconsideration of the robotaxi expansion decision because of the serious threat they pose to public safety.<sup>5</sup> San Francisco officials subsequently filed an administrative motion to pause the CPUC approved expansion.<sup>6</sup> Based on data from the San Francisco Fire Department (SFFD), robotaxis have been involved in 39 incidents since January 2023.<sup>7</sup> Due to this concerning safety record, the SFFD, San Francisco Police Officers Association (SFPOA), San Francisco Municipal Transportation Agency (SFMTA), San Francisco County Transportation Authority and the San Francisco Planning Department have expressed grave concerns about the robotaxis.<sup>8</sup> While

<sup>1</sup> IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).

<sup>2</sup> Collision Between Vehicle Controlled by Developmental Automated Driving System and Pedestrian Tempe, Arizona, March 18, 2018, Accident Report NTSB/HAR-19/03 (Nov. 19, 2019); NHTSA Office of Defects Investigation Preliminary Evaluation PE21-020.

<sup>3</sup> CPUC, CPUC Approves Permits for Cruise and Waymo To Charge Fares for Passenger Service in San Francisco (Aug. 10, 2023), available at: <https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-permits-for-cruise-and-waymo-to-charge-fares-for-passenger-service-in-sf-2023>.

<sup>4</sup> Dana Hull, San Francisco orders Cruise to cut robotaxi fleet by half and take ‘corrective actions’ after collision with firetruck, *Fortune* (Aug. 19, 2023).

<sup>5</sup> Evan Symon, San Francisco Petitioning CPUC for Reconsideration Following Robotaxi Vote, *California Globe* (Aug. 15, 2023).

<sup>6</sup> Ricardo Cano, San Francisco asks California regulators to halt approval of expanded robotaxi service, *San Francisco Chronicle* (Aug. 16, 2023).

<sup>7</sup> Russ Mitchell, San Francisco’s fire chief is fed up with robotaxis that mess with her firetrucks. And L.A. is next, *LA Times* (Jun. 22, 2023).

<sup>8</sup> San Francisco Comments on the Draft Resolution Approving Authorization for Cruise LLC’s Expanded Service in Autonomous Vehicle Passenger Service Phase I Driverless Deployment Pro-

AVs and ACMVs have both similar and differing issues in need of consideration, the San Francisco real-world experience cannot be ignored or dismissed and is essential to examine and assess when developing legislation or national policies on AVs and ACMVs in order to prevent similar or additional safety risks to all road users across the Nation.

**MOTOR VEHICLE CRASHES ARE A PUBLIC HEALTH CRISIS WHICH DEMAND IMMEDIATE ACTION USING PROVEN AND VIABLE SOLUTIONS**

On average, 118 people were killed every day on roads in the U.S. in 2021,<sup>9</sup> totaling nearly 43,000 fatalities for the year. An additional 2.5 million people were injured.<sup>10</sup> This amounts to a 27 percent increase in deaths in just a decade.<sup>11</sup> Early projections for 2022 show traffic fatalities remain high.<sup>12</sup> Specific categories of road users experienced steep increases in deaths as well. Pedestrian fatalities increased 18 percent, and bicyclist deaths were up 12 percent from 2019 (pre-pandemic) to 2021.<sup>13</sup>

In 2021, 5,788 people were killed and nearly 155,000 people were injured in crashes involving large trucks.<sup>14</sup> Since 2009, the number of fatalities in large truck crashes has increased by 71 percent.<sup>15</sup> In the first six months of 2022, traffic fatalities in crashes involving at least one large truck were up 10 percent; 2,811 people were killed.<sup>16</sup> In fatal two-vehicle crashes between a large truck and a passenger motor vehicle, 97 percent of the fatalities were occupants of the passenger vehicle.<sup>17</sup> The cost to society from crashes involving large trucks and buses was estimated to be \$143 billion in 2020, the latest year for which data is available.<sup>18</sup> When adjusted solely for inflation, this figure amounts to over \$166 billion.<sup>19</sup>

The financial impact of motor vehicle crashes on our economy and on our families is staggering. Conservatively, the annual economic cost of motor vehicle crashes is approximately \$340 billion (2019 dollars).<sup>20</sup> This means that every person living in the U.S. essentially pays an annual “crash tax” of over \$1,000. Moreover, the total value of societal harm from motor vehicle crashes in 2019 was nearly \$1.4 trillion.<sup>21</sup>

**ON THE POTENTIAL PATH TO AVS AND ACMVs, PROVEN AND EXISTING VEHICLE SAFETY TECHNOLOGIES AND POLICIES CAN SAVE LIVES, REDUCE INJURIES AND MITIGATE CRASH DAMAGES**

Fortunately, inexpensive and lifesaving solutions to prevent or mitigate motor vehicle and commercial motor vehicle (CMV) crashes are verified and readily available. What is lacking is implementation.

Advocates always has championed proven vehicle safety technologies because they are highly effective and affordable. For example, Advocates led the coalition that supported enactment of the bipartisan Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991<sup>22</sup> which included a mandate for front seat airbags as standard

gram, Order Instituting Rulemaking on Regulations Relating to Passenger Carriers, Ride-sharing, and New On-Line-Enabled Transportation Services, R.12-12-011 (May 31, 2023).

<sup>9</sup>Overview of Motor Vehicle Traffic Crashes in 2021, NHTSA, Apr. 2023, DOT HS 813 435. (Overview 2021).

<sup>10</sup>Overview 2021.

<sup>11</sup>Traffic Safety Facts 2020: A Compilation of Motor Vehicle Crash Data, NHTSA, Oct. 2022, DOT HS 813 375, (Annual Report 2020); and Overview 2021; [comparing 2012 to 2021].

<sup>12</sup>Traffic Safety Facts: Crash Stats, Early Estimate of Motor Vehicle Traffic Fatalities in 2022, NHTSA, Apr. 2023, DOT HS 813 428. (Early Estimates 2022).

<sup>13</sup>Overview 2021, Annual Report 2020.

<sup>14</sup>Overview of Motor Vehicle Traffic Crashes in 2021, NHTSA, Apr. 2023, DOT HS 813 435.

<sup>15</sup>*Id.* and Traffic Safety Facts 2020: A Compilations of Motor Vehicle Crash Data, NHTSA, Oct. 2022, DOT HS 813 375. Note, the 71 percent figure represents the overall change in the number of fatalities in large truck involved crashes from 2009 to 2021. However, between 2015 and 2016 there was a change in data collection at U.S. DOT that could affect this calculation. From 2009 to 2015 the number of fatalities in truck-involved crashes increased by 21 percent, and between 2016 to 2019, it increased by 7.6 percent, and between 2020 and 2021, it increased by 17 percent.

<sup>16</sup>Traffic Safety Facts: Crash Stats; Early Estimates of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories Through June 2022, NHTSA, Dec. 2022, DOT HS 813 405.

<sup>17</sup>Insurance Institute for Highway Safety (IIHS), Large Trucks. See: <https://www.iihs.org/topics/large-trucks>.

<sup>18</sup>2022 Pocket Guide to Large Truck and Bus Statistics, FMCSA, Dec. 2022, RRA-22-007.

<sup>19</sup>CPI Inflation Calculator, BLS, Jan. 2020 to Jan. 2023, available at [https://www.bls.gov/data/inflation\\_calculator.htm](https://www.bls.gov/data/inflation_calculator.htm).

<sup>20</sup>The Economic and Societal Impact of Motor Vehicle Crashes, 2019, NHTSA, Dec. 2022, DOT HS 813 403. (Economic and Societal Impact 2019).

<sup>21</sup>Economic and Societal Impact 2019.

<sup>22</sup>Pub. L. 102-240 (Dec. 18, 1991).



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>23</sup>

Advocates continued to support proven lifesaving technologies as standard equipment in new vehicles in other federal legislation and regulatory proposals. These efforts include: tire pressure monitoring systems;<sup>24</sup> rear outboard 3-point safety belts;<sup>25</sup> electronic stability control;<sup>26</sup> rear safety belt reminder systems;<sup>27</sup> brake transmission interlocks;<sup>28</sup> safety belts on motorcoaches;<sup>29</sup> rear-view cameras;<sup>30</sup> ADAS;<sup>31</sup> impaired driving prevention technology;<sup>32</sup> enhanced vehicle hood and bumpers to better protect vulnerable road users;<sup>33</sup> and, advanced head lamps.<sup>34</sup> The NHTSA has estimated that between 1960 and 2012, over 600,000 lives were saved by motor vehicle safety technologies.<sup>35</sup>

#### ADAS:

ADAS can prevent or mitigate crashes caused by numerous factors including distracted, drugged, drunk, and drowsy driving, and protect drivers, vehicle occupants and other road users.

Compelling and irrefutable research by the IIHS found the following benefits about ADAS components:

- 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 involving lane changes by 23 percent;
- Rear AEB can reduce backing crashes by 78 percent when combined with rear-view camera and parking sensors;
- Rear cross-traffic alert can reduce backing crashes by 22 percent; and,<sup>36</sup>
- Equipping large trucks with forward collision warning and AEB could eliminate more than two out of five crashes in which a large truck rear-ends another vehicle.<sup>37</sup>

Furthermore, 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>38</sup>

However, the widespread use of these lifesaving technologies and realizing their significant lifesaving benefits are hampered when they are not required as standard equipment on all new vehicles. Today, AEB may only be sold as part of an additional, expensive trim package along with other non-safety features, or included as standard equipment in high end models or vehicles. This situation hinders mass dissemination and safety equity by providing access only to those individuals and families who can afford an upcharge of thousands of dollars for the best brake systems.

Moreover, there are currently no minimum safety standards to ensure the technologies perform as expected and as needed to protect all road users, not just vehicle occupants. This void of regulations for ADAS needlessly endangers bicyclists, pedes-

<sup>23</sup>Traffic Safety Facts 2018, A Compilation of Motor Vehicle Crash Data, DOT HS 812 981, NHTSA (Nov. 2020).

<sup>24</sup>Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Pub. L. 106-414 (Nov. 1, 2000).

<sup>25</sup>Anton's Law, Pub. L. 107-318 (Dec. 4, 2002).

<sup>26</sup>Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59 (Aug. 10, 2005).

<sup>27</sup>*Id.*

<sup>28</sup>*Id.*

<sup>29</sup>Moving Ahead for Progress in the 21st Century (MAP-21) Act, Pub. L. 112-141 (Jan. 3, 2012).

<sup>30</sup>Cameron Gulbransen Kids Transportation Safety Act of 2007, Pub. L. 110-189 (Feb. 28, 2008).

<sup>31</sup>Infrastructure Investment and Jobs Act, Pub. L. 117-58 (Nov. 15, 2021).

<sup>32</sup>*Id.*

<sup>33</sup>*Id.*

<sup>34</sup>*Id.*

<sup>35</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>36</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>37</sup>IIHS, Study shows front crash prevention works for large trucks too, available at: <https://www.iihs.org/news/detail/study-shows-front-crash-prevention-works-for-large-trucks-too>.

<sup>38</sup>NTSB Most Wanted List Archives, [https://ntsb.gov/safety/mwl/Pages/mwl\\_\\_archive.aspx](https://ntsb.gov/safety/mwl/Pages/mwl__archive.aspx).

trians, roadside first responders, and others.<sup>39</sup> Additionally, the average age of vehicles operated on roads in the U.S. was approximately 15.7 years in 2022.<sup>40</sup> Further delays on issuance of Final Rules will needlessly extend the length of time for ADAS to attain market saturation in the light vehicle (i.e., car) and CMV fleets.

The Infrastructure Investment and Jobs Act (IIJA) took steps to remedy this deficiency.<sup>41</sup> The law requires the U.S. DOT to issue a final rule within two years for AEB in large CMVs and the issuance of a Federal Motor Carrier Safety Regulation (FMCSR) to require drivers use AEB.<sup>42</sup> The U.S. DOT issued a Notice of Proposed Rulemaking (NPRM) in July.<sup>43</sup> The IIJA also required U.S. DOT to promulgate a rule requiring AEB on passenger vehicles.<sup>44</sup> The U.S. DOT subsequently issued an NPRM in June.<sup>45</sup> Advocates submitted comments to both proposed rules. When these two rules are completed and implemented, they will have a significant impact on safety and result in substantial reductions in highway deaths and injuries. It is incumbent that the U.S. DOT not delay completion of comprehensive regulatory action and meet statutory deadlines.

#### *Teen Truckers:*

Despite the growing number of needless truck crash deaths and injuries, the IIJA unfortunately allows the DOT to implement a pilot program allowing teens to drive an 80,000 lb. truck in interstate commerce. This program runs counter to numerous studies conducted by the IIHS and others that have found that “age is a strong risk factor for truck crash involvement.”<sup>46</sup> CMV drivers under the age of 19 are four times more likely to be involved in fatal crashes, as compared to CMV drivers who are 21 years of age and older, and CMV drivers ages 19–20 are six times more likely to be involved in fatal crashes (compared to CMV drivers 21 years and older).<sup>47</sup> The general pattern of over-involvement in fatal crashes for younger CMV drivers dominates all other factors. Studies of young CMV drivers show that as the age of the driver decreases, large truck fatal crash involvement rates increase.<sup>48</sup> Generally, younger drivers are more likely to be involved in fatal crashes because they lack driving experience and skills and tend to take greater risks. Development of the brain region vital to decision making and complex tasks, specifically the pre-frontal cortex, may not be fully reached until one’s mid-20s.<sup>49</sup>

Diverse stakeholders including safety groups, law enforcement, public health and consumer organizations, truck drivers, labor unions, some trucking companies, and truck crash victims and survivors have repeatedly opposed efforts to lower the age to operate CMVs in interstate commerce. Additionally, the public has resoundingly rejected lowering the minimum age for interstate truck and bus drivers. According to a 2020 public opinion poll conducted by Engine’s Caravan Survey, a large majority, 62 percent of respondents, oppose reducing the minimum driving age for interstate operations.<sup>50</sup>

The IIJA included a provision requiring the establishment of a pilot program to permit teen truckers to operate in interstate commerce.<sup>51</sup> If accepted research protocols are not followed by the Federal Motor Carrier Safety Administration (FMCSA), it could result in preventable deaths and injuries and will also jeopardize the legitimacy of the outcomes of the program. Additionally, the agency’s recommendations and conclusions in the required report to Congress must be supported by sufficient evidence and data collected during the program.

<sup>39</sup>Note some ADAS may not be appropriate for certain CMV operations.

<sup>40</sup>Robert Ferris, Cars on American roads keep getting older, CNBC (Sep. 28, 2021).

<sup>41</sup>Pub. L. 117–58 (Nov. 15, 2021).

<sup>42</sup>*Id.*

<sup>43</sup>88 FR 43174, July 6, 2023.

<sup>44</sup>Pub. L. 117–58.

<sup>45</sup>88 FR 38632 (June 13, 2023).

<sup>46</sup>Insurance Institute for Highway Safety, Comments to the docket, FMCSA–2000–8410–0515; citing Christie, R. and Fabre, J. 1999. Potential for fast-tracking heavy vehicle drivers. Melbourne, Australia: National Road Transport Commission; Blower, D. 1996. The accident experience of younger truck drivers. Ann Arbor, MI: University of Michigan Transportation Research Institute; Frith, W.J. 1994. A case-control study of heavy vehicle drivers’ working time and safety. *Proceedings of the 17th Australian Road Research Board Conference*, 17–30. Queensland, Australia: Australian Road Research Board; Stein, H.S. and Jones, I.S. (1988).

<sup>47</sup>Campbell, K. L., *Fatal Accident Involvement Rates By Driver Age For Large Trucks*, *Accid. Anal. & Prev.* Vol 23, No. 4, pp. 287–295 (1991).

<sup>48</sup>Campbell, K. L., *Fatal Accident Involvement Rates By Driver Age For Large Trucks*, *Accid. Anal. & Prev.* Vol 23, No. 4, pp. 287–295 (1991).

<sup>49</sup>Arian, M, et al., Maturation of the adolescent brain, *Neuropsychiatric Disease and Treatment* (Apr. 3, 2013).

<sup>50</sup>Engine’s Caravan Survey Public Opinion Poll (2020).

<sup>51</sup>Pub. L. 117–58, § 23022 (2021).

*Speed Limiters:*

Advocates has consistently supported the use of speed limiting devices for CMVs. As detailed by the FMCSA, the safety benefits of controlling the speed of a CMV are incontrovertible. The agency noted, “crashes involving heavy vehicles traveling faster are more deadly than crashes involving heavy vehicles traveling at lower speeds.”<sup>52</sup> Further, a 2012 study commissioned by FMCSA “showed strong positive benefits for speed-limited trucks.”<sup>53</sup> Speed governing technology is used throughout the industry and is supported by drivers.<sup>54</sup> Already, speed limiting systems are required throughout the world including in Canada, the United Kingdom and Australia.<sup>55</sup>

Data provided by FMCSA also demonstrates safety benefits of setting the speed at 60 miles-per-hour (MPH). The agency estimates that setting the device at 60 MPH has the potential to save almost 500 lives and prevent nearly 11,000 injuries annually. By comparison setting the speed at 65 or 68 MPH will result in far less lives saved and injuries prevented. In fact, setting the speed at 60 MPH will result in over five times the number of lives saved and injuries prevented each year compared to 68 MPH.<sup>56</sup>

For FMCSA to fulfill its mission to reduce crashes, injuries, and fatalities involving large trucks and buses, the agency must not be prevented from promptly completing an overdue and necessary rulemaking to require the use of speed limiting technology on CMVs.

*Underride Guards:*

Technology is currently available that can prevent a passenger vehicle from traveling underneath the rear or side of a trailer and significantly increase the chances of survival. The NTSB has recommended rear, side, and front underride protection.<sup>57</sup> The IIHS conducted crash testing of side underride guards in 2017 that demonstrated the device’s effectiveness.<sup>58</sup> IIHS conducted crashes at both 35 and 40 MPH.<sup>59</sup> At both speeds the side underride guard which was tested prevented the vehicle from traveling under the side of the trailer resulting in no passenger compartment intrusion of the test vehicle.<sup>60</sup> Moreover, the side underride guard tested by IIHS is currently available for purchase to the public.<sup>61</sup> Requiring side underride guards on trailers could save many lives and prevent numerous serious debilitating injuries over the long use life of a trailer. As such, U.S. DOT should require the installation of comprehensive underride protection (side and front) for the entire CMV.

In June 2022, NHTSA updated the rear underride guard standard, yet it remains insufficient.<sup>62</sup> The IIHS has created a TOUGHGUARD award for improved rear guard performance.<sup>63</sup> The standard issued by U.S. DOT in 2022 does not meet the standards of the IIHS crash testing despite nine of the largest trailer manufacturers having been given the award.<sup>64</sup> Advocates and other safety groups have filed a petition for reconsideration of the rule that is pending before NHTSA.

*Protect Current Federal Truck Size and Weight Limits:*

Federal weight and size limits are essential to protecting truck drivers, the traveling public, and our Nation’s roads and bridges. According to the 2021 Infrastructure Report Card from the American Society of Civil Engineers, America’s roads receive a grade of “D,” and our bridges were given a “C.”<sup>65</sup> Nearly 40 percent of our 615,000 bridges in the National Bridge Inventory are 50 years or older, and one out

<sup>52</sup> 81 FR 61944 (Sep. 9, 2016).

<sup>53</sup> *Id.* at 61950.

<sup>54</sup> Preliminary Regulatory Impact Analysis (PRIA) and Initial Regulatory Flexibility Analysis, FMVSS No. 140, Speed Limiting Devices, p. 28 (NHTSA, Aug. 2016); Insurance Institute for Highway Safety (IIHS), Speed limiters in trucks would serve 2 purposes, Status Report, Vol. 45, No. 8 (Aug. 21, 2010).

<sup>55</sup> PRIA.

<sup>56</sup> See: 81 FR 61942 (Sep. 7, 2016).

<sup>57</sup> NTSB Safety Recommendations H-10-12, H-10-13, H-14-03, H-14-02, H-14-04.

<sup>58</sup> IIHS, Side guard on semitrailer prevents underride in 40 mph test (Aug. 29, 2017).

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

<sup>60</sup> *Id.*

<sup>61</sup> *Id.*

<sup>62</sup> 87 FR 42339 (Jul. 15, 2022).

<sup>63</sup> IIHS, Truck Underride Guard Ratings, available at: <https://www.iihs.org/topics/large-trucks/truck-underride>.

<sup>64</sup> *Id.*

<sup>65</sup> 2021 Infrastructure Report Card—Bridges, American Society of Civil Engineers (ASCE); 2021 Infrastructure Report Card—Roads, ASCE.

of 11 is structurally deficient.<sup>66</sup> Raising truck weight or size limits could also result in an increased prevalence and severity of crashes. Longer trucks come with operational difficulties such as requiring more time to pass, having larger blind zones, crossing into adjacent lanes, swinging into opposing lanes on curves and turns, and taking a longer distance to adequately brake.

*ELDs:*

Truck driver fatigue is a well-known and well-documented problem in the motor carrier industry. In fact, the NTSB repeatedly has cited fatigue as a major contributor to truck crashes.<sup>67</sup> Advocates sought the installation of electronic logging devices (ELDs) to record drivers' hours of service (HOS) to increase compliance and thereby reduce driver fatigue and fatigue related crashes. ELDs were required in the Moving Ahead for Progress in the 21st Century (MAP-21) Act.<sup>68</sup> Unfortunately, some segments of the trucking industry continue to seek exemptions from the ELD requirement.<sup>69</sup> We urge Congress to reject all attempts to evade compliance with this lifesaving mandate.

*Infrastructure Impacts:*

The IJA includes directives to the U.S. DOT to conduct research on the impacts of automated, connected and platooned vehicles on the infrastructure including wear on roadway pavements as well as a report to Congress on the existing and future impacts of AVs to transportation infrastructure, mobility, the environment, and safety. This information will be critical in understanding the complexity of operating AVs on roadways, identifying foreseeable issues and necessary mitigations, and determining future policies for this developmental technology. Advocates urges this Subcommittee to ensure this research is completed without further delay.

EXPERIMENTAL AUTONOMOUS TECHNOLOGY REMAINS UNPROVEN AND LACKS PUBLIC SUPPORT

While the benefits of ADAS are clear, the same is not so for several partial automation and fully autonomous technologies for both cars and trucks which are lacking independent supportive evidence or data.

The current testing and deployment of AVs in San Francisco is alarming. Several San Francisco transportation agencies submitted comments to the CPUC in May detailing numerous dangerous incidents involving AVs operating in the city.<sup>70</sup> These events include:

- Interfering with emergency response operations including 18 incidents documented by the San Francisco Fire Department in which AVs put firefighters and the public at risk.
- Making planned and unplanned stops in travel lanes that have interfered with transit service and blocked traffic.
- Intrusions into construction zones where City employees were working.
- Obstructions caused by AVs having to interpret and respond to human traffic control officers.
- Erratic driving.<sup>71</sup>

These treacherous incidents are also on the rise. The agencies indicate that during this year reported monthly incidents involving AVs have increased six-fold.<sup>72</sup> In fact, in June an AV blocked San Francisco police from responding to a shooting.<sup>73</sup> What San Francisco has been experiencing must not be replicated across the Nation by continuing to allow for the proliferation of AVs that do not comply with any federal safety regulations setting minimum performance standards for driverless systems. Again, while AVs and ACMVs have notable differences, many lessons can be

<sup>66</sup>2021 Infrastructure Report Card—Bridges (ASCE).

<sup>67</sup>National Transportation Safety Board, 2016 Most Wanted List, accessed at [nts.gov/safety/mwl/Documents/MWL2016\\_Brochure\\_web.pdf](https://www.nts.gov/safety/mwl/Documents/MWL2016_Brochure_web.pdf).

<sup>68</sup>Pub. L. 112–141 (2012).

<sup>69</sup>H.R. 4820, Transportation, Housing and Urban Development, and Related Agencies Appropriations Act, 2024, 1st Sess., 118th Cong. (2023).

<sup>70</sup>San Francisco Comments to the Draft Resolution Approving Authorization for Waymo Autonomous Vehicle Passenger Service Phase I Driverless Deployment Program, R.12–12–011 (May 31, 2023). Available at: [chrome-extension://efaidnbmninnibpcajpcgiclegfindmkaj/https://sfstandard.com/wp-content/uploads/2023/06/SF-Comments-on-Waymo.pdf](https://sfstandard.com/wp-content/uploads/2023/06/SF-Comments-on-Waymo.pdf).

<sup>71</sup>*Id.* at pgs. 9–11.

<sup>72</sup>*Id.* at p. 3.

<sup>73</sup>Self-driving car blocks police responding to San Francisco shooting, KTVU (Jun. 11, 2023). Available at: <https://www.ktvu.com/news/self-driving-car-blocks-police-responding-to-san-francisco-shooting>

learned from AV deployment in San Francisco so known problems are avoided in future applications.

Moreover, several fatal crashes involving cars equipped with automated driving systems (ADS) or varying levels of driving automation have been subject to investigation by the NTSB and NHTSA. These investigations have and will continue to identify safety deficiencies, determine contributing causes, and recommend government and industry actions to prevent future deadly incidents. Advocates urges this Subcommittee to consider critical information from our Nation's preeminent crash investigators to inform any policies related to AVs.

*The Washington Post* reported in June that according to NHTSA data, there have been 17 fatal incidents, five serious injuries and 736 crashes involving Tesla vehicles operating in Autopilot mode since 2019.<sup>74</sup> As of June 2022, NHTSA's Office of Defects Investigation (ODI) indicated that it had identified at least fourteen crashes in which a Tesla vehicle operating under its "Autopilot System" or Traffic Aware Cruise Control collided with vehicles at crash scenes where first responder vehicles lights and other control measures such as flares and cones were in place. The ODI has yet to conclude this investigation. This action must be a priority for NHTSA because of the serious safety implications associated with these troubling and recurring incidents. Findings from all these investigations should be publicly released and incorporated as applicable into any future legislation or regulation pertaining to AVs.

It is encouraging that NHTSA has taken several essential steps to address the substantial safety concerns associated with vehicles equipped with ADAS and ADS. Advocates supports NHTSA obtaining valuable data involving vehicles equipped with Level 2 ADAS and ADS through Standing General Order 2021-01 (SGO).<sup>75</sup> The agency indicates that it believes the frequency of crashes equipped with these systems will increase.<sup>76</sup> This unique information can help the agency identify common problems or systematic issues with certain vehicles and/or equipment.<sup>77</sup> According to data collected by the SGO, there have been approximately 344 crashes involving ADS and 1,049 with ADAS. These include 27 crashes resulting in a fatality.<sup>78</sup> While it is important that NHTSA continues to collect this data, Advocates supports enhancing the SGO as outlined by several Members of Congress in a February 28, 2023 letter to the agency.<sup>79</sup>

The IIHS also has performed invaluable research on the Level 2 ADAS marketed as a convenience feature intended for highway driving for passenger motor vehicles. They have determined that if a manufacturer does place partial automation convenience systems in a vehicle, it should have essential safeguards to help prevent misuse that can result in dangerous situations such as failure to pay attention to the driving task.<sup>80</sup> These include driver monitoring systems to help ensure driver engagement with alerts to the driver that rapidly escalate in urgency and timing. In addition, emergency interventions such as slowing or stopping the vehicle are needed when driver disengagement with the driving task is detected, and the driver fails to respond appropriately. Additional safety protocols prohibiting a driver from using the system while unbuckled or when crash avoidance systems are disabled are critical. Consumer Reports (CR) currently rates partially automated driving systems, but only if they have adequate driver monitoring systems.<sup>81</sup> IIHS has announced that it plans to issue ratings on the performance of the safeguards that partial automation employs to help drivers stay focused on the roads including escalating alerts and appropriate emergency procedures.<sup>82</sup>

Considering the current inadequate performance of partial automation and fully autonomous technologies, it is unsurprising that the public has significant concerns. In February 2023, Advocates commissioned a public opinion poll that found that 83 percent of respondents were concerned with sharing the road with driverless cars.

<sup>74</sup> Faiz Siddiqui and Jeremy B. Merrill, *17 fatalities, 736 crashes: The shocking toll of Tesla's Autopilot*, Wash. Post (Jun. 10, 2023).

<sup>75</sup> 86 FR 54287, 54288; 87 FR 4099 (Jan. 26, 2022).

<sup>76</sup> *Id.*

<sup>77</sup> *Id.*

<sup>78</sup> Data includes crashes from July 2021–July 2023.

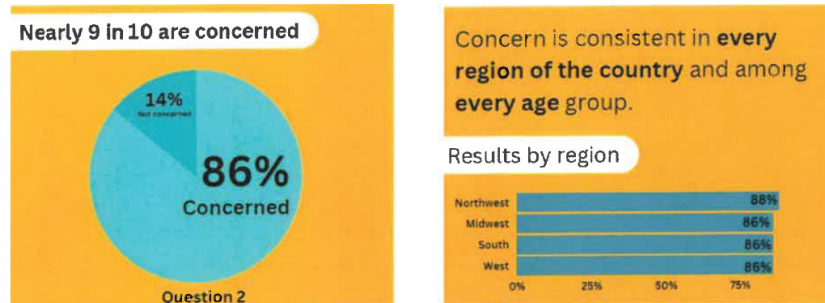
<sup>79</sup> Letter from Reps. Schakowsky, Castor and Trahan to NHTSA Acting Administrator Ann Carlson (Feb. 28, 2023).

<sup>80</sup> IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).

<sup>81</sup> Mike Monticello, *Ford's BlueCruise Ousts GM's Super Cruise as CR's Top-Rated Active Driving Assistance System*, Consumer Reports (Jan. 25, 2023).

<sup>82</sup> IIHS, IIHS creates safeguard ratings for partial automation (Jan. 20, 2022).

This number increased to 86 percent of respondents regarding driverless trucks.<sup>83</sup> Yet, 64 percent of respondents indicated that their concerns would be addressed if the vehicles were required to meet minimum government standards.<sup>84</sup>



#### ENSURING THE SAFE DEVELOPMENT OF AUTONOMOUS TECHNOLOGY

Development and deployment of AVs and ACMVs must be undertaken without jeopardizing public safety. The following commonsense safeguards are necessary to ensure those in and around AVs and ACMVs are protected. This also will help bolster consumer confidence in the technology and guide development to ensure the promised societal benefits are attained.

##### *Adoption of Basic AV Tenets Will Guarantee Safety and Public Acceptance*

Advocates spearheaded the compilation of the “AV Tenets,” a people-and-safety-first approach to AV development and deployment that identifies policy positions which should be a foundational part of any AV policy.<sup>85</sup> This comprehensive approach is based on expert analysis, real world experience, and public opinion and is supported by 65 stakeholders representing safety, consumer, public health, labor, bicyclists, pedestrians, disability rights, smart growth, and others. It has four main, commonsense categories including: 1) prioritizing safety of all road users; 2) guaranteeing accessibility and equity for all individuals including those with disabilities; 3) preserving consumer and worker rights; and, 4) ensuring local control and sustainable transportation. Many promises have been touted about AVs and ACMVs bringing reductions in motor vehicle crashes and resultant deaths and injuries, lowering traffic congestion and vehicle emissions, expanding mobility and accessibility, improving efficiency, and creating more equitable transportation options and opportunities. The AV Tenets will be necessary to help realize these goals as well as mitigate potential negative consequences. Among the numerous recommendations in the AV Tenets, requiring that AVs meet minimum standards, including for cybersecurity, and that operations are subject to adequate oversight, including a comprehensive database accessible by vehicle identification number (VIN) with basic safety information, will be critical to putting safety first with regards to this burgeoning technology.

##### *Vigilant Oversight of ACMVs is Essential*

The emergence of experimental ACMVs and their interactions with conventional motor vehicles, trucks and buses and all road users for the foreseeable future demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs, including those with ADS, be regulated by U.S. DOT with enforceable safety standards and subject to adequate oversight. The potential of an 80,000 pound truck equipped with unregulated and inadequately tested technology on public roads is a very real and dangerous scenario if these vehicles are only subject to voluntary guidelines. In addition, automated passenger carrying CMVs which have the potential to carry as many as 53 passengers will need additional comprehensive federal rules specific to this mode of travel.

At a minimum, ACMVs must be subject to the following essential provisions:

- In the near term, rulemakings must be promulgated for elements of ACMVs that require performance standards including but not limited to the ADS, human machine interface, sensors, privacy, software and cybersecurity. ACMVs

<sup>83</sup> ENGINE'S CARAVAN SURVEY, Public Concern About Driverless Cars and Trucks (Feb. 2023).

<sup>84</sup> *Id.*

<sup>85</sup> A summary of the AV Tenets is attached as an Appendix.

must also be subject to a “vision test” to guarantee they properly detect and respond to other vehicles, all people and objects in the operating environment. Also, a standard to ensure ACMVs do not go outside of their operational design domain (ODD) should be issued.

- Drivers operating an ACMV must have an additional endorsement or equivalent certification on their commercial driver’s license (CDL) to ensure they have been properly trained to monitor and understand the ODD of the vehicle and, if need be, to operate an ACMV. This training must include a minimum number of hours of behind-the-wheel training.
- Each manufacturer of an ACMV must be required to submit a safety assessment report that details the safety performance of automated driving systems and automated vehicles. Manufacturers must be required to promptly report to NHTSA all crashes involving ACMVs causing fatalities, injuries and property damage.
- ACMVs that do not comply with Federal Motor Vehicle Safety Standards (FMVSS) must not be introduced into commerce nor be subject to large-scale exemptions from such.
- Any safety defect involving the ACMV must be remedied before the ACMV is permitted to return to operation. The potential for defects to infect an entire fleet of vehicles is heightened because of the connected nature of AV technology. Therefore, manufacturers must be required to promptly determine if a defect affects an entire fleet. Those defects which are fleet-wide must result in notice to all such owners and an immediate suspension of operation of the entire fleet until the defect is remedied.
- The U.S. DOT Secretary must establish a database for ACMVs that includes such information as the vehicle’s identification number; manufacturer, make, and model; the level of automation of each automated driving system with which the vehicle is equipped; the ODD of each automated driving system; and, the FMVSS, if any, from which the vehicle has been exempted. Also, when ACMVs move beyond testing into deployment, they should be required to comply with the SGO.
- For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid CDL in the vehicle at all times. Drivers will need to be alert to oversee not only the standard operations of the truck but also the ADS. Therefore, the Secretary must issue a mandatory safety standard for driver engagement. In addition, critical safety regulations administered by FMCSA such as those that apply to driver HOS, licensing requirements, entry level training and medical qualifications must not be weakened.
- Motor carriers using ACMVs must be required to apply for additional operating authority.
- FMCSA must consider the additional measures that will be needed to ensure that ACMVs respond to state and local law enforcement authorities and requirements, and what measures must be taken to properly evaluate an ACMV during roadside inspections. In particular, the safety impacts on passenger vehicle traffic of several large ACMVs platooning on bridges, roads and highways must be assessed.
- NHTSA must be given imminent hazard authority to protect against potentially widespread catastrophic defects with ACMVs, and criminal penalties to ensure manufacturers do not willfully and knowingly put defective ACMVs into the marketplace.
- NHTSA and FMCSA must be given additional resources, funding, and personnel, in order to meet demands being placed on the agencies due to the advent of AV technology.

Without these necessary safety protections, commercial drivers and those sharing the road with them are at unacceptable risk. Allowing technology to be deployed without rigorous testing, vigilant oversight, and comprehensive safety standards is a direct and unacceptable threat to the motoring public which is exacerbated by the sheer size and weights of large CMVs.

#### *ACMVs Will Impact our Nation’s Infrastructure*

The design of our roads—from the asphalt, to the signage, to the lighting, to the speed limit—is largely based on the history of human performance behind the wheel and the capability of the vehicles. The introduction of AVs and ACMVs stands to essentially require a re-write of many of these guidelines for road design and use

in the future. However, in the near term, there will need to be an evaluation of how standards for design can be enhanced and possibly altered to safely accommodate both human and machine “drivers.”

Every driver has experienced road signs or markings that have been damaged, intentionally altered or blocked by objects. This could lead to misinterpretation of roadway and highway cues and result in stopped or misdirected AVs and ACMVs that will present additional hazards. Both human and machine “drivers” would benefit from improved lane marking as well as establishing standards for pavement resurfacing to ensure that repair seams and color differences do not confuse AV systems. Establishing uniform standards for signage color, lighting, contrast, letter size, and other roadway features will likely benefit the performance of AVs and ACMVs and will also reap similar advantages for human drivers in the interim. Many of the current manuals’ guidelines and recommendations are almost always open to engineering interpretation. With the advent of AVs and ACMVs, more emphasis must be placed on consistency, and consideration must be given to the effects variations can have on autonomous driving technology. While a human driver can see a unique situation and interpret those circumstances, an AV or ACMV may not be able to do the same. Research already has shown that minor distortion of a sign can cause havoc for AVs, causing stop signs to be interpreted as speed limit signs, a confusion which can have serious, and potentially fatal, results.<sup>86</sup> Clearly, new rules are required if ACMVs are allowed on our roadways on a widespread basis.

Roadway deterioration and delayed repair, which are common occurrences on existing infrastructure, will have a negative impact on AV and ACMV operation. Additionally, the lower variance of an AV’s, including ACMVs, position within a lane could lead to accelerated wear in lanes, and condensed convoys of automated trucks, commonly known as platooning, could place further strain on roads and bridges. These concerns must be evaluated to consider operational constraints for AVs and ACMVs before further damage is inflicted upon our Nation’s roads and bridges which are already weakened and in dire need of fortification and updating, as mentioned above. For example, the spacing between ACMVs in a platoon could have wide-ranging implications. If these large vehicles travel too closely together, their combined weight load could place severe stress on a bridge. In addition, lengthy platoons which consist of many ACMVs could be difficult to pass and affect merging and exiting from roadways.

Taking into consideration the long-term ramifications, the budgetary constraints, the impacts on safety, and the necessary coordination among a diverse group of stakeholders when it comes to planning and implementing infrastructure projects at any level, research on the impact of AVs on our roads is clearly needed. In addition, further research is required to examine the differing infrastructure upgrades that will be required for urban, suburban, and rural regions. More analysis and deliberation must be given to this complex issue before AVs, particularly ACMVs, can be deployed.

#### *Dispelling Misleading Claims about AVs and ACMVs*

Some proponents of ACMVs claim that they will relieve supply chain issues by addressing the so-called “driver shortage” within the trucking industry by eliminating the need for human drivers and allowing for the more efficient movement of goods through the constant operation of trucks. However, harsh and unsafe working conditions for truck drivers have created a retention crisis, not a driver shortage. In fact, the U.S. Department of Labor has determined that “the labor market for truck drivers works about as well as the labor markets for other blue-collar occupations” and “a deeper look [at the truck industry labor market] does not find evidence of a secular shortage.”<sup>87</sup> In addition, states issued more than 50,000 new CDLs and permits each month on average in 2021, demonstrating that there are candidates to fill vacancies.<sup>88</sup>

The supply chain issues currently facing the Nation are complex and will not be solved by the introduction of ACMVs, which will not be ready for prime time in the near future. This technology still faces significant operational challenges such as responding to all participants in the transportation ecosystem including traffic control officers and vulnerable road users as well as differing weather conditions. Moreover, the constant operation of trucks raises serious questions as to the ability to properly

<sup>86</sup> Evtimov, Ivan & Eykholt, Kevin & Fernandes, Earlene & Kohno, Tadayoshi & Li, Bo & Prakash, Atul & Rahmati, Amir & Song, Dawn. (2017). Robust Physical-World Attacks on Machine Learning Models.

<sup>87</sup> United States Department of Labor, Bureau of Labor Statistics, Is the U.S. labor market for truck drivers broken? (Mar. 2019).

<sup>88</sup> FACT SHEET: The Biden-Harris Administration Trucking Action Plan to Strengthen America’s Trucking Workforce (Dec. 16, 2021).



service vehicles continuously in use. Even without this potential new regime, 23 percent of CMVs were placed out of service in 2022 for maintenance issues.<sup>89</sup> In addition, many of the issues with the physical condition of the truck that would be identified by a human driver during a pre- or post-trip inspection as well as problems during a trip such as the shift of a load or other emergencies noted by a human driver may not be identified or corrected under this type of use.

Furthermore, adding an autonomous driving system into passenger carrying vehicles such as buses does not negate the need for a driver. Human interaction remains essential. Beyond the operational task, these professional drivers have a myriad of other responsibilities including assisting individuals with disabilities on and off the bus safely, managing emergency situations and the delivery of medical care, and coordinating safe transportation for all people.

Supporters of ACMVs also contend that placing autonomous systems in a CMV is not as daunting a task as with passenger vehicles because CMVs operate largely on highways, an easier environment for the technology to master. Operating a CMV on a congested highway at a high rate of speed is a complicated task in a dangerous environment as evidenced by the fact that a quarter of fatal crashes involving CMVs occur on highways.<sup>90</sup> Additionally, as CMVs do not operate exclusively on highways, safe operations on the more complex environment of the first and last mile must be achieved.

Lastly, supporters of ACMVs also claim that the technology will eliminate most crashes citing a statistic accredited to NHTSA which indicates that 94 percent of crashes are due to human error or the fault of the driver.<sup>91</sup> Their use of this statistic is misleading. The agency has noted in the same report which includes this data point that “[t]he critical reason is the immediate reason for the critical pre-crash event and is often the last failure in the causal chain of events leading up to the crash. Although the critical reason is an important part of the description of events leading up to the crash, *it is not intended to be interpreted as the cause of the crash nor as the assignment of the fault to the driver, vehicle, or environment*” (emphasis added).<sup>92</sup> This statistic was rebuked by NTSB Chair Jennifer Homendy who stated, “At the same time it relieves everybody else of responsibility they have for improving safety, including DOT . . . You can’t simultaneously say we’re focused on a ‘safe system’ approach—making sure everybody who shares responsibility for road safety is taking action to eliminate fatalities and serious injuries . . .—and have a 94% number out there, which is not accurate.”<sup>93</sup> There are often multiple causes of a crash and replacing human error in the operation of a vehicle, when it does occur, with unproven, unreliable and unsafe technology is not an acceptable solution to reducing the death toll on our Nation’s roads.

Some proponents of advancing the deployment of AVs contend the U.S. is at risk of falling behind other nations unless it takes steps to merely promote and identify a regulatory “framework” rather than regulate ACMVs. However, this fear-inducing claim is inaccurate. In fact, other countries are taking a more calculated, careful, and cautious approach to the development of AVs.<sup>94</sup> For example:

- China continues to require permits or restricts operations of AVs on its roads to only those areas approved by the authorities.<sup>95</sup>
- Germany continues to require permits, approvals, and limits areas of operation for AVs.<sup>96</sup>
- In Japan, the introduction of Level 4 vehicles will be controlled and limited to specific, lightly populated areas.<sup>97</sup>

<sup>89</sup> See: FMCSA Enforcement Programs.

<sup>90</sup> U.S. DOT, Large Truck and Bus Crash Facts 2019, Table 5, Report FMCSA–RRA–20–055 (Oct. 2021).

<sup>91</sup> Singh, S. (2015, February). Critical reasons for crashes investigated in the National Motor Vehicle Crash Causation Survey. (Traffic Safety Facts Crash Stats. Report No. DOT HS 812 115). Washington, DC: National Highway Traffic Safety Administration.

<sup>92</sup> *Id.*

<sup>93</sup> Hope Yen and Tom Krisher, NTSB chief to fed agency: Stop using misleading statistics, Associated Press (Jan. 18, 2022).

<sup>94</sup> Autonomous vehicles: cross jurisdictional regulatory perspectives update, Oct. 7, 2022.

<sup>95</sup> China drafts rules on use of self-driving vehicles for public transport; Aug. 8, 2022, Reuters; and Baidu bags China’s first fully driverless robotaxi licenses, Aug. 7, Reuters. Real driverless cars are now legal in Shenzhen, China’s tech hub, Jul. 25, 2022, TechCrunch+.

<sup>96</sup> Germany completes legal framework for autonomous driving—Federal Cabinet approves new ordinance, Apr. 2022, Malterer, M.

<sup>97</sup> Japan to open roads to autonomous vehicles in 2023, Nov. 28, 2022, Wessling, B., The RobotReport.

- Even the latest United Nations Economic Commission for Europe (UNECE) regulations will limit operations to restrict risks and oversee approval through testing and other requirements.<sup>98</sup>

According to the most recent KPMG analysis, the U.S. ranks fourth in the world for AV readiness, while China stands at number twenty. In short, the U.S. is not lagging other countries in allowing AVs to go to market, but we are behind in establishing comprehensive regulations to ensure public safety will not be jeopardized or diminished. As Dr. Missy Cummings, Professor, George Mason University, College of Engineering and Computing, and a well-respected expert on autonomy and robotics, stated during a briefing convened by Advocates in March 2023:

I was a military officer; I spent three years on the Defense Innovation Board advising the Secretary of Defense. China is a real threat, a real problem that we have to address from a national security perspective. What it [China] is not is a threat to our commercialization of autonomous vehicles. And any insistence that it actually takes away from the emphasis that we need to place on national security. So, what I would really like everyone to do is back off the China fear mongering. China is not beating us to the commercialization of autonomous vehicles . . .<sup>99</sup>

In sum, no country is selling fully automated vehicles to the public and by many accounts, none will be for a significant time in the future.<sup>100</sup> The U.S. is not behind other countries in allowing them to go to market, but we are behind in establishing and enforcing comprehensive safeguards to ensure that this process happens without jeopardizing or diminishing public safety.

The fact remains that there is scant independently verifiable data that ACMVs can operate safely on any road or help to address any of the Nation's longstanding supply chain issues. Furthermore, we already know from real world experience the limitations, mistakes, defects, failings, and faults of self-driving technologies currently in cars. It would be irresponsible and an abrogation of safety to allow self-driving trucks, weighing 80,000 pounds and traveling at high speeds to operate on streets and highways with cars, motorcycles, and other road users without first meeting basic minimum performance requirements established with federal government standards.

#### CONCLUSION

Since our founding in 1989, Advocates has supported and worked to advance in federal legislation and government rulemaking the safe and equitable development and requirement for proven technologies to reduce crashes and save lives on our Nation's roads. Consequential and worthwhile societal benefits and improvements to public safety will require implementing and enforcing mandatory comprehensive safeguards to ensure AV and ACMV technology is developed and deployed without putting the public at risk. To address the current motor vehicle crash crisis, public officials should work to require the installation of available, advanced, and proven safety technologies in all new vehicles and improving our compromised infrastructure. Concurrently, the approach of the AV Tenets should be utilized to ensure the safety of all road users and address the known and foreseeable challenges and issues of AV operations. Advancing safety and moving forward with innovation can and must be compatible goals, and not trade-offs. The public deserves that its safety on our public roadways be the number one priority and that known safety solutions be implemented immediately.

#### APPENDIX

##### Autonomous Vehicle (AV) Tenets November 30, 2020

[Editor's note: The Autonomous Vehicle (AV) Tenets are retained in committee files and are available online at <https://saferoads.org/wp-content/uploads/2020/11/AV-Tenets-11-24-20-1.pdf>]

<sup>98</sup>New rules to improve road safety and enable fully driverless vehicles in the EU, Jul. 6, 2022, UNECE.

<sup>99</sup>Advocates for Highway and Auto Safety, Virtual Capitol Hill Briefing: Expert Panel on Autonomous Vehicle Safety (Mar. 7, 2023). See: <https://saferoads.org/briefing-expert-panel-on-autonomous-vehicle-av-safety-3-7-23-public/>.

<sup>100</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).

Mr. CRAWFORD. Thank you.

And let the record reflect that each of our four witnesses came in under their allotted time, which rarely happens. I appreciate that.

I now recognize Members for questioning, starting with myself.

Mr. Spear, I appreciate everything ATA and its members do to improve safety and the quality of life for our Nation's truckdrivers, particularly during this week as we honor our truckdrivers in National Truck Driver Appreciation Week.

This committee believes in the value of American truckers, as do you. I know that is the case. We are exploring new technologies. And that is not to try and displace truckers. It is actually to assist truckers.

And I want to know if you agree with that statement and, if so, can you expand on it a little bit.

Mr. SPEAR. I do.

I really draw attention, as we were talking through our opening statements, about the shortage of talent. We see it across every segment of employment, but specific to truckdrivers, we are short right now 78,000 drivers. We are going to have to bring in 1.2 million more over the next decade just to meet economic demand and deal with an aging, retiring workforce. So, there is a massive gap here to fill.

Innovation can play a role, Mr. Chairman. It has the ability to not only enable our existing driver force to be more aware and responsive and have more command and control when they are driving, which is good for the motoring public, that breeds safety, but it also has the development of autonomous vehicles in years to come where we can fill that gap.

If we are not going to add workforce to fill that 78,000, we are going to need technology. We are going to need innovation to play that role.

So, we believe that there is a place for both to cohabitate, and displacement is a myth.

Now, if we didn't have a shortage, we would be having a candid discussion about people losing their jobs. That is not the case here. There is no data to support that. I have read all the letters and everything that has been submitted to you. I can assure you displacement is a myth.

So, there is plenty of room for innovation to play a role. We need to embrace it. And it has serious measurable benefits to safety.

Mr. CRAWFORD. Thank you.

I want to turn to Mr. Urmson if I could.

We are living in a world now where we face a lot of cyber threats. And so, I want to give you an opportunity to kind of explain how your technology addresses that evolving threat. Because what is happening today doesn't look like what will happen tomorrow and the next day with regard to cyber threats.

Mr. URMSON. Thank you for the question.

Obviously, cybersecurity is a much broader topic than automated vehicles. We have this challenge whether it is with our industrial infrastructure or with vehicles that are on the road today.

At Aurora, we take this very seriously. Our whole business is our intellectual property and the systems we are developing.

And so, we have invested heavily in a cybersecurity team. I think we have around 50 people that are dedicated to improving the cybersecurity both of our corporate infrastructure but, importantly, the product infrastructure.

They look at best practices, various standards that are promulgated, even though it is, of course, from NIST, and we integrate that into the way we develop our system.

So, as you know, we have to continue to innovate in this space. It is kind of a running battle. But we feel well-equipped to fight that battle.

Mr. CRAWFORD. Thank you.

Mr. Farrah, real quick. Monday, the California Senate passed a bill requiring a driver in any autonomous vehicle over 10,000 pounds. What is the impact of this legislation on our Nation's supply chain?

Mr. FARRAH. Mr. Chairman, thank you very much for the question.

The bill I believe you are referring to is AB 316. And, interestingly enough, Governor Newsom's agencies at a State level, including the Department of Motor Vehicles, the Governor's Office of Business and Economic Development, other agencies, have vociferously opposed this bill. They have noted that it would be detrimental from a safety and supply chain perspective to California.

I think that it really goes back to what I said during the opening statement, which is that we need to move more freight in this country, otherwise, we are letting down the people that depend upon the supply chain.

That is acutely the case in California. You have seen a lot of strains that have happened on the ports of Long Beach and in Los Angeles. This is something where a lot of the prominence of those ports has shifted east, and that has certainly benefited other States.

And California is very vital to our supply chain. And so, if they ultimately reject this technology, this is something where it not only locks in the safety status quo, which is unacceptable, on California's roads, it also continues to put California behind the eight ball.

And so, we are hopeful that Governor Newsom's agencies are able to ultimately make this point very loud and clear, and we are hopeful that the Governor will veto that bill.

Mr. CRAWFORD. Thank you. And I would again thank the witnesses.

I yield the balance of my time and recognize Ranking Member Norton.

Ms. NORTON. Thank you, Mr. Chairman.

Ms. Chase, your testimony was a little scary. You held up a picture that I took note of. And you note that there are currently no standards to ensure that driver assistance technologies protect those outside of the vehicle, including pedestrians and cyclists.

As we see the advancement from driver assistance technology to fully self-driving vehicles, we need to protect these vulnerable road users even more.

What should Congress and the Department of Transportation be doing to ensure that partially and fully automated vehicles will prioritize the safety of those walking and bicycling on our roads?

Ms. CHASE. Thank you for the question, Ranking Member Norton.

I want to first clarify that my staff informed me that I misspoke. I said “automatic emergency trucks” instead of “automatic emergency braking.” And that brings me to answer your question, actually.

On the road to protect vulnerable road users, we should be advancing proven technologies that we know work now. For example, the Insurance Institute for Highway Safety, which is well known for its crash testing down in Ruckersville, Virginia, is a very prominent and respected organization, and they have demonstrated that automatic emergency braking can reduce front-to-rear large truck crashes by 41 percent. That is pretty tremendous if you think about it.

So, on the path to autonomous vehicles, as we think about protecting all road users, including vulnerable road users, we really need to make sure that technologies like automatic emergency braking and other advanced driver assistance systems get into all trucks now.

We know how to save lives. We just need Congress and the U.S. Department of Transportation, as you suggested, to make it happen.

There are also other technologies, like underride protections, speed limiters, and electronic logging devices, which are required in cars now, but there are currently special interests who request exemptions. We need to protect ELDs because they do make sure that truckdrivers are following the hours-of-service requirements.

So, in sum, there are steps that can be taken on the path to automated trucks that could be saving lives now.

Ms. NORTON. Thank you.

Mr. Farrah, now, I think, if I recall correctly, that you said displacement would not occur, that the autonomous vehicle companies, indeed, frequently claim that job losses in long-haul trucking will be replaced by more jobs in short-haul routes.

But a recent study by the University of Michigan and Carnegie Mellon University found that the loss of long-haul jobs will not be made up for either in quantity or in quality by short-haul jobs.

The study notes that short-haul jobs typically pay less and that many truckdrivers will have to relocate to find those jobs. These factors could weaken a job option that has long served as a path to the middle class.

Can you respond to the study’s findings about losses in the long-haul trucking sector?

Mr. FARRAH. Thank you very much for the question. I appreciate it. I would be happy to take a look at the study and take a look at those specifics and engage with you and your staff.

What I will say, as a general matter, is that the reality is, is that we are not moving as much freight in this country as we need to today. We are certainly not going to be able to move as much freight as we need to tomorrow and in many years from now. So,

we as a country need to figure out a way to do this given the shortages that are happening.

Autonomous trucking is one of the solutions that is part of a suite of solutions that we can all work together on to ultimately ease a lot of these supply chain challenges.

And so, we are trying to be a part of the overall composition of that. We think this is something where there is plenty of work to go around, both for truckdrivers, for autonomous trucking companies. This will ultimately allow alleviation of a lot of the supply chain burden.

And so, that is the aim of our industry and certainly the way we see things playing out over a very long period of time.

Ms. NORTON. Mr. Urmson, you testified that Aurora is hoping to launch fully self-driving trucks, without a safety driver in the cab, by the end of next year. Even if your technology works perfectly, it will essentially need to make life-or-death decisions when unexpected conditions arise.

Is Aurora able to guarantee that its technology will prioritize the safety of people—not property, not infrastructure, but people—when making split-second decisions on the highway?

Mr. URMSON. Thank you for the question.

And safety is paramount to how we approach developing technology at Aurora.

Today, we implement what we call a safety case, which is a framework that explains how and why we come to the conclusion that the vehicle is safe to operate, and we have shared that transparently and publicly.

We do a lot of development in simulation where we test challenging scenarios, including ones that you talk about.

Just as a concrete example, we looked at fatal accidents that involve trucks on I-45, where our trucks are operating today, between the years 2018 and 2022.

Across those, there are about 29 of those events where the Aurora Driver could have actually been operating the vehicle, and had the Aurora Driver been operating, none of those events would have happened, which translates to no fatalities in those situations.

To give you an idea of the type of situations that come up, there was one event that we looked at where two passenger vehicles had had a minor fender bender. The people got out of the vehicle, were assessing it. A heavy truck came down the road behind them, for whatever reason noticed the event late, and then swerved on the shoulder to avoid the vehicles and ultimately killed some people.

In our simulations, what happens is exactly what you had hoped would happen. The truck sees them at range, reacts, decelerates, and then lane changes to the left to avoid the scene, and everybody would have gone home safely.

So, we take that objective very seriously.

Mr. CRAWFORD. The gentlewoman's time has expired.

Mr. Bost, you are recognized for 5 minutes.

Mr. BOST. Thank you, Mr. Chairman.

And I am going to say more of a statement. I am not even going to ask questions.

Many of you know that I grew up in a trucking company. I drove trucks. I lived it. We started a business in—I didn't start a business in 1933, I am not that old, but my grandfather did.

But I have some serious concerns as far as AV trucking. And I want to be real clear that I am not opposed to it.

At the same time, I want to make sure that certain important roles of human drivers are not lost because of that innovation.

I have sat in the seat, like I have told you. I ran the company. It is a small company.

My big concern is, is that the only ones who will have access are the mega trucking companies and/or those that can make the major investments and that it will strangle the small trucking companies out of business. I have concerns about that.

I also have concerns about how much safety it is that we can actually put in autonomous trucks. I know that the technology is there. I also know that we have enemies around this world that know how to tap into technology and can cause major concern if we have a lot of them running up and down our roads and would possibly do some kind of technology that would cause a loss or a breakdown when we become dependent on too many of the autonomous trucks.

I know the concerns that we have. I know the concerns we have. And we put ourselves into a lot of this situation in this United States. One, I think the fact is, is that we have made it so difficult for drivers quite often to get their license.

In my company, we never let anybody who was unsafe drive. We checked them out. But now we have put rules in place that says: No, no, no. Now you are going to pay a lot of money to send them to a truck driving school. And then a bigger company can take them away, and you have spent all the money on educating and making sure you have a safe driver.

Not only that, we have States throughout this Nation that keep legalizing marijuana, and we can't get drivers to pass a simple drug test because once you smoke one joint, that shows up in your bloodstream for 30 days. It is not like having a beer on Sunday and driving on Monday.

So, we have put ourselves in a lot of bad situations by existing laws. I think we still have a problem, as far as I am concerned, of hours in service and with the electronic logbooks because it doesn't allow for drivers to use the common sense and common safety that would encourage them to stay in the trucking business. All of a sudden, they are an hour from home and they are plenty rested, they can't go ahead and get back home. Instead, they have to find a place to pull over.

And many of you know that I am also carrying the language for truck parking because you see all the problems we have out there right now. And I appreciate your support on doing that.

But my statement is just this. I know everybody wants to be safe, but I think there are certain safety mechanisms that we can't guarantee. We can't guarantee what hackers might be able to get into and put autonomous trucks at risk to our people. I mean, I think we can put a lot of safety in there, but we have got to be very, very, very careful.

And I would hate to see a truck driving industry—I know we need drivers now, but I would hate to see this grow so much that we are no longer dependent on our truckdrivers. They do a good job.

I am always bothered by the fact, whenever I am driving down the road with some friends, and you have all done it or you have all seen it happen, and you are following behind and one truck is trying to pass another truck and you are in a hurry and, by golly, you are griping at the truckdriver.

You should never bad mouth the truckdriver or the farmer when your mouth is full. It just isn't wise.

And let me say that we have got to make sure that the drivers that are making sure the shelves are full have the opportunity to continue to get good-paying jobs doing the work that many of them love, and I just don't want to see us head down a path where we would destroy that.

And I am sure this technology is going to move forward. There are no ifs, ands, or buts about it. But I am concerned about those issues. I know that each one of you are bringing them up, and I know you are watching them very closely. But on this week and month where we are thanking our truckdrivers, we want to make sure that we are truly thanking them, not putting them out.

So, thank you.

Mr. CRAWFORD. The gentleman yields.

Ranking Member Larsen.

Mr. LARSEN OF WASHINGTON. Thank you, Mr. Chair.

The first question is for Ms. Chase.

In hearing quite a bit about safety, much of this potential seems to be years away. And in your testimony, you talked through steps that can be taken today.

What would be the top three steps we could take today to improve truck safety and save lives that we are not doing?

Ms. CHASE. Thank you for the question, Ranking Member Larsen.

As I briefly touched upon with the previous question, I think that automatic emergency braking, getting that into trucks today, would be a significant improvement to reducing truck crashes and also car crashes. Additionally, if we get override protections on both the rear and the side.

And for those of you unfamiliar, who may be unfamiliar with what an override crash is, it is when the trailer of a truck, which is about at the neck height of a car passenger, goes underneath the truck.

And these are particularly gruesome crashes. And if someone survives, they most likely suffer significant brain injury or had to undergo many surgeries. We have worked with crash victims who have survived, and it is a very difficult life to go through.

So, those are the top two.

And then the third one, as I mentioned, are speed limiters. We know that about 1,000 people are being killed every year in crashes involving speeding trucks.

So, if we get the trucks to slow down—and many trucks already have speed limiters, so, this is nothing new. We need to just make



sure that they are in all trucks to slow the trucks down and make the roads safer.

And thank you again for the question.

Mr. LARSEN OF WASHINGTON. Thanks.

Mr. Farrah, you mentioned the 44 or now 45 million miles on public roadways that autonomous trucks have traveled. The fatality rate is 1.24 deaths per 100 million miles. So, you are not even halfway through the standard for the number of miles that we use for highway fatality rates. So, there is quite some time to go.

And I am not as enthusiastic about the safety record because I don't think there has been enough work yet to be enthusiastic about the safety record, is my point.

But I was curious about, absent more real-world data, has your organization looked at any other proactive safety standards to help prove out AV technology in terms of safer roadways?

Mr. FARRAH. Congressman, thank you very much for the question.

I should begin by saying I think that your district, in particular, stands to benefit quite significantly from autonomous trucking, given the proximity to ports and I-5 and other economic activity.

In terms of data that is out there, the most important thing that I would point out is that, as you are probably aware, for more than 2 years, through NHTSA, the Department of Transportation has required any autonomous vehicle company to report any incident, no matter how minor, when the technology is engaged.

And so, specific to autonomous trucking, this is really a very remarkable safety record that we now have data on. What we know is that there have only been 14 incidents during that 2-year time period related to autonomous trucking—

Mr. LARSEN OF WASHINGTON [interrupting]. You testified to that. So, absent more real-world data, do you support any proactive safety standards to help better prove out AV technology in terms of safer roadways?

Mr. FARRAH. Congressman, I think that we are seeing that real-world data, both through the SGO, also in terms of our members as they are passing through different intervals, 1 million, 2 million, 5 million miles driven. They are producing a lot of that. That is being shared in a very transparent way.

And so, there is not a shortage of information out there about the safety record of autonomous vehicle companies, and it is something that we are quite proud of.

Mr. LARSEN OF WASHINGTON. You used the term "model driver," and so, I just want to tee up Mr. Urmsen on this one a little bit, because on I-45, that might actually be a model roadway for you. You are not going to get model roadways in the Pacific Northwest or along the northern tier of the country to fully test out safety records.

So, what are you all doing—other than thinking about your simulations—what are you all doing to better prove out in nonmodel conditions the operations of AV technology on trucks?

Mr. URMSON. Thank you for the question.

I think this is an important concept to understand in automated vehicles.

Mr. LARSEN OF WASHINGTON. Can you speak up and just pull the microphone—

Mr. URMSON [interrupting]. I apologize. I will try. Is that any better, sir?

Mr. LARSEN OF WASHINGTON. Yes, it is.

Mr. URMSON. OK. Sorry about that. It sounded loud here.

So, as we think about developing the technology, there is actually constraints we can put on it, where it we will operate. And so, as we initially deploy the technology, the Aurora Driver we constrain to operate initially on the route between Dallas and Houston, and then we expect from there to go between Fort Worth and El Paso.

And for each place where we expand out to, we are going to go through a thorough process that fits into that safety case concept that I mentioned earlier where we evaluate what is different between this new place to drive and the last place, incorporate that understanding, and broaden the test suite that we expose the driver to.

So, before we ever operate in the Pacific Northwest, where there is rain and sleet and all of that, we will make sure that we have actually done the development and validation work that is necessary for there.

And there is a real reason why a lot of the freight moves along the southern freight corridor, because driving a good truck in bad weather is still difficult for human drivers, and so, they try to avoid it.

And so, as we see the technology coming out, it will follow that commonsense approach and that rigorous approach to deployment.

Mr. LARSEN OF WASHINGTON. For the record, we get a lot of rain and sleet, but not like 365 days of the year. Just for the record.

With that, I yield back.

Mr. CRAWFORD. The gentleman yields.

Mr. LaMalfa.

Mr. LAMALFA. Thank you, Mr. Chairman.

I would like to compare the potential—I know there is a lot of safety that is driving this conversation here—but the comparison, let's say, between highways full of trucks and our railroad system, for example.

So, work has been done to have better train control over the years. And I know, "Why are you talking about trains?" Well, because railroads have a dedicated lane, so to speak, that only trains are on, pulling many, many, many tons and very efficiently in doing so. But they are having difficulty even keeping the safety record perfect on railroads.

If they were to be autonomous, versus thousands and thousands of trucks all trying to operate off of the same set of satellites or what have you, how in the world are we going to do that with so many vehicles when we have a certain amount of difficulty right now with a lot fewer on a dedicated lane that doesn't have automobiles, doesn't have a whole lot of people on them, doesn't have trucks with drivers?

How do we expect to integrate that many vehicles when it has not been that easy with railroads.

So, why don't—do you want to tackle that, Mr. Spear?

Mr. SPEAR. Yes. I think—and I will give some deference, too, to where the technology stands in terms of differentiating between highways, where there are smoother roads, lines painted, the technology functions based off of indicators that allow it to perform at an optimal level. I think country roads, rural environments, to delineate between that, I think that is something that would have to evolve much longer than the testing and deployment that we are seeing today—

Mr. LAMALFA [interrupting]. No, no. What I am asking, though, is we are talking about it is difficult enough to keep a safety record going on railroads, which are on dedicated tracks, dedicated lanes, so to speak. And now we are talking about many thousands of vehicles all trying to operate.

How about, Mr. Urmson, would you take a shot at that?

Mr. URMSON. Thank you for the question.

And I think this is one of the places where there is an opportunity where we see to leverage modern technology.

So, for example, when our trucks are driving down the road, every second they are evaluating thousands of different parameters to ensure that they are operating at peak performance, whether that is the cycle times for the computation, the health of the sensors, the health of the base platform. And so, that level of—

Mr. LAMALFA [interrupting]. You are going to have a lot more sensors on a whole freeway system than you already have on, say, lesser miles of railroads with lesser numbers of vehicles, meaning trains.

So, I am wondering how much are you asking for technology to try and move forward with so many independent autonomous vehicles. I know truckdrivers aren't perfect, but I appreciate them during Truck Driver Appreciation Week.

So, let me morph this into a rural aspect, as we touched on here. So, do you see this as being primarily something that is being done in urban areas with high volumes of traffic?

Because I am trying to imagine how this is going to work in rural districts like mine, moving mine products or timber products out of the woods onto rural roads and then meeting larger railroads and finally interstate, perhaps. Is this going to be adapting well to those conditions?

Mr. URMSON. So, again, we don't see this as a big-bang deployment all at once. We expect this technology to roll out incrementally, much as Mr. Spear has talked about, to complement other functions—or other operators on the roadway. And so, we will initially target long-haul trips on interstates.

Eventually, I could imagine this technology operating in those environments, but that won't be the initial deployment. This is how come we have so much confidence that this will be complementary to the skills that our human driving—

Mr. LAMALFA [interrupting]. So, do you see this as a—in the Western States, you are frequently going to have—you were talking about weather a minute ago with heavy snows, rains, lots of rain in the high country. Since so much of the West is on fire so much of the summer and the fall, how about smoke? I mean, how is that going to interfere with the technology you are speaking of?

Mr. URMSON. Thank you for the question.

And, again, here one of the things I can say is our company was founded in Pittsburgh, Pennsylvania. It is part of the Nation that has all four seasons. And so, even in the first year that we were developing the technology, we were out in a parking lot testing in snow.

Once again, we are able to constrain the technology. So, if the weather is so inclement that it shouldn't operate, then it won't. But the technology—

Mr. LAMALFA [interrupting]. Well, then we are going to have to have a backup plan to have available drivers that can operate these autonomous vehicles. It is already difficult enough to have these drivers with so many—the regulations and many other challenges.

So, we shouldn't run too headlong too fast into this autonomous situation, which I don't know if it is really seeking a solution to a problem that isn't as huge as would be sold to us.

So, Mr. Chairman, I will yield back. Thank you.

Mr. CRAWFORD. The gentleman yields.

Mrs. Napolitano, you are recognized.

Mrs. NAPOLITANO. Thank you, Mr. Chair.

Ms. Chase, in jurisdictions across the country that have started to allow autonomous transit, ride-sharing, and AVs, what have been the results, both positive and negative, on the impact and the safety aspect of them?

Ms. CHASE. Thank you for the question.

I would like to focus first on the negative parts because there has been a lot of conversation today about all of the positive parts of AVs.

I think we really need to pay attention to what is happening in realtime in San Francisco. And we know that these AVs have interfered with emergency response operators, including 18 incidents documented by the San Francisco Fire Department in which AVs put firefighters and the public at risk. We also know that they have made planned and unplanned stops in travel lanes that have interfered with transit service and blocked traffic.

Additionally, intrusions into construction zones where city employees were working have happened, and obstructions caused when AVs have had to interpret and respond to human traffic control officers, police officers. They don't know what to do, especially if you have them—a New York police officer and a police officer in California don't necessarily speak the same way or use the same hand mannerisms.

And lastly, erratic driving. One of my staff members actually went to the arts conference in San Francisco and took a ride—three rides, actually, in driverless cars, and all three of them had problems. In one of them, he was told to leave the vehicle and that a vehicle would come and get him and never did. And this was after midnight in San Francisco, which could be potentially dangerous.

So, in short, these are just not ready for primetime.

Let me just say, Advocates for Highway and Auto Safety has always been a champion of proven safety technologies, and we hope that someday autonomous vehicles will help to relieve the mounting traffic crash fatality and injury toll. But as far as we can tell

from data that has been collected from the standing general order and from the press and from other sources, it is not happening yet.

Mrs. NAPOLITANO. Thank you.

Mr. Urmson, how important are roadway markings, roadway signs, and maintenance to affect the operations of AVs or autonomous trucks? And would the Federal Government, the State government, or local governments have to invest in roadway striping, restriping, and maintenance in affected projects in order to make autonomous trucking work?

Mr. URMSON. Thank you for the question.

Our intent in delivering the technologies, it needs to meet the world where it is today. And so, if it is good for human drivers, it will be good for automated vehicles. So, there are benefits to road safety of having clear markings for people driving on those roads. If it is good for people, it will be good for us.

Mrs. NAPOLITANO. But who does the striping?

Mr. URMSON. Who does the striping? The Department of Transportation, I imagine, does the striping.

Mrs. NAPOLITANO. And the cost would be a little bit more than normal striping?

Mr. URMSON. No. No. No, ma'am. We don't believe that you need to change anything about the striping that is on the roadways today.

Mrs. NAPOLITANO. OK. Thank you.

I am concerned about the company's application to be exempt from the requirements of placing traditional warning devices around the truck. What if the electrical system doesn't work on the truck? What are possible alternatives? And have you tested if the alternative is as safe as traditional warning devices?

Mr. URMSON. So, thank you for the question.

We see this as a real opportunity to improve roadway safety. That today, if a truck breaks down on the side of the road, someone has to get out into the roadway and put warning triangles behind it. Obviously, our automated vehicles, the intent is to not have an ability to go do that.

We have developed a—we call it a beacon. You can think of it as lights, right, like, on the back of a tow truck that are on the sides of the truck to indicate that it has stopped in a place where it wouldn't normally be stopped.

And we and an independent group have evaluated the performance of that and see that it is as good as putting cones behind or triangles behind the vehicle without exposing someone to the roadway. So, we see this as a really important safety advantage.

Mrs. NAPOLITANO. But what if the electrical system on the truck is not working?

Mr. URMSON. What if the additional system on the truck is not working? Again, thank you for the question.

I think someone would have to go and deploy cones at some point behind it. But we are talking about a light, which we think is a relatively straightforward technology to keep working. And the trucks have redundancies in the power that is distributed to them. So, you would have to have many things fail at the same time for that to occur.

Mrs. NAPOLITANO. Thank you.

Mr. Spear, what do you believe will be the impact on the type and number of jobs in the trucking industry by increased automated trucking?

Mr. SPEAR. As I said earlier, Congresswoman, I think that there is an opportunity for both innovation and the existing workforce to coexist.

We have a gap. We have a shortage of talent that we are trying to fill just to meet economic demand. So, there is a lot of opportunity for innovation to fill that, particularly for driver assist technologies levels 2, 3, 4, which really empower a driver to be safer in operating their equipment.

We are a ways yet to see fully automated driverless trucks out there, but the progression toward that, we believe there is plenty of space without displacing drivers.

Mrs. NAPOLITANO. Thank you, sir.

Thank you, Mr. Chair.

Mr. CRAWFORD. Thank you.

Mr. Owens, you are recognized.

Mr. OWENS. Thank you.

I first of all want to thank Chairman Crawford for today's hearing and our witnesses for taking the time to help this subcommittee to better understand and support the topic.

Innovation in how Americans move and transport goods has long underpinned America's ingenuity. The challenge of keeping our Nation connected and commerce flowing manifested early in our Nation's history. My home State of Utah is central to this history, fulfilling the manifest destiny of our young Nation with the completion of the transcontinental railroad.

Since then, America has continued to be at the forefront of transportation and logistical innovation, introducing the world to our automobiles, interstate highways, commercial aviation, space exploration, ride-sharing, to simply name a few.

Today, the growing premise of autonomous vehicles on our highways is the next era of transportation innovation. Automation holds a promise to enhance safety and efficiency while also stimulating economic growth in our commercial motor vehicle sector.

As the pace of technology accelerates, we must embrace these advancements. However, this topic must be approached with caution and with a commitment to addressing complex issues around safety, infrastructure, workforce impact, and cybersecurity.

After safety, my constituents are most concerned on the impact of American jobs. This conversation is incomplete without simultaneously exploring strategies for workforce development training and ensuring the future includes fulfilling and meaningful employment.

My goal is to ensure that our workforce needs and education evolves as this industry evolves.

Mr. URMSON, are we losing progress on innovation because we are not keeping pace in terms of our Government itself? And what steps should Congress take to boost the U.S. AV industry?

Mr. URMSON. Thank you. I have certainly answered to much worse than that, so, I appreciate the question.

As we look at the situation America is in right now in this space, we see that we are leading, that we have incredibly gifted people

come here, develop this technology, and have a lead. But we know that, for example, China is investing heavily and working hard to ultimately eclipse us.

I think that as a Nation, we need to continue to foster innovation in this space. There is an opportunity, whether it is, as we talked about with the warning beacons, to start to see this technology out on the road and deployed, the opportunity to support that with FMCSA.

We see an opportunity to continue to harmonize regulations across States, that because the value of this technology is really about deepening interstate commerce, the more consistent regulations are, the easier it will be and the better benefit we will see from the technology.

Mr. OWENS. OK. Thanks so much.

Mr. Spear, what would be the impact if we overregulated or prohibited fully autonomous trucks?

Mr. SPEAR. Well, I think what we are looking for is more oversight at the Federal level. We have talked a little bit about NHTSA and their standing general order, their ability to exhibit oversight. But we are also talking about commercial vehicles. NHTSA has more of a role in leadership and expertise in passenger vehicles.

We need the FMCSA to be more involved and in sync with NHTSA in the development and oversight of this technology. We need a Federal framework. It needs to be a performance and safety standard. Don't pick favorites.

And we have forward-leaning policies on speed limiters, ELDs, AEB. But we want a performance standard that lets innovation thrive, and we want it to govern all 50 States. We don't want a patchwork of rules that are confusing, not only to innovation, but to our industry's ability to adopt it.

So, your ability to hand DOT—particularly NHTSA and FMCSA—the structure, the staff, the resources so that they have the expertise to oversee a Federal framework. Make it a performance standard. That is something that we all understand and can measure. You are going to have more data coming in. You all are going to have much better oversight and understanding where this is trending if you give us that Federal framework.

So, that would be something that we would recommend. Our testimony exhibits that.

Mr. OWENS. In the last few seconds, what would be the result if we cede leadership in this industry to China?

And I am going to—Mr. Farrah, would you mind maybe addressing that?

Mr. FARRAH. Thank you, Congressman. I would be happy to.

And I want to underscore what Mr. Urmson said about competition with China. The reality is, is that China wants to be the world leader when it comes to autonomous vehicle technology. We need to make sure that that doesn't happen. We need to make sure the United States is the global leader.

It means Congress working on a bipartisan basis with FMCSA on making sure that we have got clarity on important rules. This hearing is an important piece of that, and I certainly appreciate the opportunity to talk to you today about that.

Mr. OWENS. OK. Thank you.

And I yield back.

Mr. CRAWFORD. The gentleman yields.

Mr. JOHNSON of Georgia.

Mr. JOHNSON OF GEORGIA. Thank you, Mr. Chairman.

Ms. Chase, safety on our highways has long been a priority of mine. In previous Congresses, I introduced the Safe Roads Act, which would mandate automatic emergency braking systems for truck tractors, tractor-trailers, 18-wheelers, with electronic stability control technology. This critical piece of legislation became a part of the Bipartisan Infrastructure Law.

While our goal is to prevent crashes of all types, a mechanical or other failure on an 80,000-pound tractor-trailer truck or a 55-passenger bus or a hazmat truck filled with propane gas can be catastrophic, particularly when compared to the consequences of a simple automobile wreck.

Ms. Chase, do you believe that prudence requires that we should be even more cautious about deploying level 3, 4, and 5 automated commercial motor vehicles on our roads than we should be about the deployment of autonomous automobiles? And if so, why?

Ms. CHASE. Thank you for your question, Congressman. Also, thank you very much for your safety leadership. We appreciate that you have made it a priority in your portfolio to make sure that the roads are safer for your constituents and everyone in the country. So, thank you very much.

Yes. I think, absolutely, we need prudence when we are discussing autonomous vehicles of any level. What we know so far is that—the biggest sample that we have so far is San Francisco. And it is not going so well, to say the least.

When we have the San Francisco fire chief coming out publicly and saying that she has tremendous trepidation about what is happening on her roadways because it is imperiling firefighters to get to their scenes, it's a problem. We can't just stick our head in the sand and pretend that these real problems aren't happening.

So, when you talk about—

Mr. JOHNSON OF GEORGIA [interrupting]. An emergency vehicle, like an ambulance dispatched to pick up or to tend to an elderly patient having a heart attack, or an infant that swallowed a button or something, that kind of vehicle—or a firetruck having trouble getting to the destination to put out the fire or to render life-or-death aid to a person, automated vehicles are interfering with that process?

Ms. CHASE. Yes, it is. In fact, in addition to the firetrucks, there was a live crime shooting scene in San Francisco, and the police department could not get to the shooting scene because of obstructions of autonomous vehicles.

So, we need to deal with these known problems. We know these problems exist. We can't just move forward.

Mr. JOHNSON OF GEORGIA. So, we need to be careful as we move forward.

Ms. CHASE. Yes, sir.

Mr. JOHNSON OF GEORGIA. We certainly know that automated vehicles are coming, but we need to be careful about rolling them out and deploying them on our streets.



You have heard the argument that deployment of autonomous trucks on the road will actually reduce motor vehicle crashes. What are your thoughts on that assertion?

Ms. CHASE. Well, maybe they can. We don't know yet.

Mr. JOHNSON OF GEORGIA. Not yet?

Ms. CHASE. Not yet. Not yet. We are not there yet.

Mr. JOHNSON OF GEORGIA. I got you. OK.

Let me move on to Mr. Urmson.

Aurora has publicly supported laws which liberalized autonomous vehicle operations, but which also impose liability on an AV certificate holder for negligence arising from the operation of Aurora Driver. Is that correct?

Mr. URMSON. I believe so, yes.

Mr. JOHNSON OF GEORGIA. And do you believe that that common-sense liability requirement should be adopted nationally?

Mr. URMSON. Thank you for the question.

As we look at the regulatory regime here and the liability regime, we see a legal system that actually is robust and works.

And we have introduced new products across the last century, and they have all been able to fall under the current tort system, and we anticipate that this technology is no different, that product liability is a mechanism that will work well here.

Mr. JOHNSON OF GEORGIA. OK. Thank you.

Mr. Spear, I heard you say during your testimony that displacement of workers is a myth. How do you contend that that statement is true?

Mr. SPEAR. Because there is no data to back up that we are going to displace workers. We have a gap. We have a shortage.

Mr. JOHNSON OF GEORGIA. I am talking about taking drivers out of the—I mean, my colleague—

Mr. SPEAR [interrupting]. There is no evidence of that, Congressman. None.

Mr. JOHNSON OF GEORGIA. You are going to then have drivers—

Mr. SPEAR [interrupting]. When you have a shortage of 78,000 drivers, there is plenty of space for innovation to play a role. We have got to add talent.

Mr. JOHNSON OF GEORGIA. But eventually you would eliminate all drivers, though, correct?

Mr. SPEAR. I am not bought into that. We have got to add 1.2 million drivers over the next 10 years. How are you going to do that if we can't add more people behind the wheel? There is a role for innovation to fill that gap, and it will not displace drivers.

We will take them. If you can give me 1.2 million, I will take them. They are not out there.

Mr. JOHNSON OF GEORGIA. Well, maybe if we stop testing for marijuana, which stays in the blood for 30 days—

Mr. SPEAR [interrupting]. I don't want people high behind the wheel—

Mr. CRAWFORD [interrupting]. The gentleman's time has expired. The gentleman's time has expired.

Mr. SPEAR. Yes, I can't get behind that.

Mr. CRAWFORD. The gentleman's time has expired.

Mr. Yakym.

Mr. JOHNSON OF GEORGIA. At least think about it.

Mr. YAKYM. Thank you, Mr. Chairman.

And thank you to our witnesses for lending your expertise on this important issue.

Autonomous vehicles are an exciting and intriguing technology, but this is also a topic that requires a lot of education and thoughtful consideration.

I would like to follow up on one of Chairman Crawford's earlier questions and comments on cybersecurity as it pertains to autonomous vehicles because I think that in a lot of ways, it's core not just to security, but also to the safety and the overall confidence in autonomous vehicles.

There are a lot of roads we can go down in this conversation, whether it is safeguarding data, ensuring privacy, preventing hacking and hijacking, protecting trade secrets, and probably many more. But I would like to kind of drill down here on a few of these specifics.

And maybe, Mr. Urmson or Mr. Farrah, could one or both of you talk about what measures are taking place in the autonomous vehicle industry to ensure privacy? And when I say "privacy," maybe be specific to things like user locations and camera privacy. Things like that. Can you maybe expound on that a little bit, please?

Mr. URMSON. Maybe I could start and then turn it to Mr. Farrah to talk broadly. So, I can talk about what we are doing at Aurora.

So, today, we are complying with all of the privacy requirements that we have to comply with, that are out there, and that we actually have a robust policy in place to respond to law enforcement requests for data from our vehicles.

Mr. FARRAH. Congressman, certainly I appreciate the interest. This is something that is a core tenet of the industry.

I'll say that what Mr. Urmson said, from my perspective, seems to be applicable across the industry. There is a deep commitment to cybersecurity, a lot of investment that goes into this. There are particular ways that we mitigate against cybersecurity intrusions that we can follow up for the record and give additional information.

Specific to data privacy, obviously, these vehicles are out on the roads and needing to collect data to make the performance safe. That is something that is critically important. We realize that a lot of responsibility comes with that. There are a host of measures that are taken across the industry. And, again, we can provide more specifics after this hearing.

Mr. YAKYM. Thank you.

And also to Mr. Urmson and Mr. Farrah, can one or both of you talk about what measures are being taken in the autonomous vehicle industry to safeguard against hijacking threats? I mean, what happens if there is a breach in cybersecurity? Is it possible for someone remote to actually take over and commandeer a vehicle remotely?

Mr. FARRAH. Congressman, I will begin, and maybe Mr. Urmson wants to share his perspective from his company.

What I will say is that these vehicles are the most monitored vehicles on the road. Obviously, there is a tremendous amount of capital investment, technological investment that has gone into them.

They are under the custody of the companies. These are fleet-managed. And so, the companies themselves have control over them. There are command centers, obviously, that are making sure that these are being treated appropriately.

The other thing that is important to underscore here is that these vehicles cannot just go anywhere, anytime. There is a specific operational design domain. This is a set of limiting circumstances, whether it is geographical, whether it is other types of circumstances. And so, they are confined to that space.

All this goes to making sure that they are going where they need to go, making sure that they are not being used inappropriately, they are not subjected to cybersecurity intrusion.

And so, this is something where there is very strong alignment from the industry as well as policymakers.

Mr. URMSON. Again, thank you for the question.

Just talking concretely about what Aurora does, we have this technology called a fault management system, and that is the part of the Aurora Driver that is monitoring constantly all different systems. One of the things it is looking for is our various cybersecurity checks.

And when it comes to remote operation of the vehicle, we actually follow best practices on how you can connect to the vehicle, and we can constrain what is expressed. So, there isn't somebody with a Logitech steering wheel somewhere steering the thing down the road. Really, the interface looks much more like a taxi dispatcher communicating information that is kind of not critical realtime to the truck about what might be beneficial for it.

Mr. YAKYM. Great.

And finally, can one of you briefly talk about what steps are being taken to prevent this technology from falling into the hands of one of our adversaries? Let's say someone like China, who we know is world-renowned for intellectual property theft.

Mr. URMSON. Again, thank you for the question.

For us, that is our business, right, is the intellectual property. And so, for us, we take that seriously. We have what we think is a world-class team. It is about 50 people that are working on both the cybersecurity of our corporate infrastructure but also on the product infrastructure.

Mr. YAKYM. Great.

Mr. FARRAH. I will just say, Congressman, very briefly—I know we are at time here—but this really underscores why it is important for policymakers to support the development of the American autonomous vehicle industry. We need to make sure these jobs are here, these companies are here, we have got a robust supply chain, and we are very happy to have this conversation today.

Mr. YAKYM. Thank you.

And, Mr. Chairman, I yield back.

Mr. CRAWFORD. The gentleman yields.

Mr. Stanton.

Mr. STANTON. Thank you very much, Mr. Chair, for holding this hearing.

And thank you for each of the witnesses for your great testimony today.

Arizona generally, and my district, specifically, in the East Valley, have been at the epicenter for the development and testing of autonomous vehicles. Autonomous vehicles have the potential to transform our transportation system, improve mobility for vulnerable populations and those who face barriers to transportation, enhance vehicle safety, reduce vehicle crashes and death, and increase productivity. At the same time, we need to recognize that AVs have the potential to alter our workforce.

My questions. The first one is for Mr. Urmson, Mr. Farrah, and Mr. Spear. Choose if you want to each answer or just one of you.

How are you engaging with truckdrivers who have extensive experience driving millions of miles as this technology is being developed?

Mr. URMSON. So, truckdrivers are critical to how we develop this technology. Today, we have 40-some of them on staff at Aurora. It is important to me they are actually employees of the company. They own equity in the company. As the company is successful, we anticipate them benefiting from that success as well.

If you look at someone like Tom Randall, who is on our staff, he has driven for 40 years. He sees the opportunity to introduce new technology into a career that he has loved, and that experience translates directly into the way we develop the technology. His quality driving on the road is what we model the behavior and what the Aurora Driver learns from so that they can drive well and safely down the road.

Mr. STANTON. Mr. Farrah?

Mr. FARRAH. Congressman, thank you very much, and I appreciate your leadership on this policy area.

I will say that I think today's hearing is an incredibly important moment because we need to be clear as an industry that the autonomous vehicle industry needs truckdrivers. We see a strong role for coexistence. This is something where we are not a panacea. We want to be a tool to help with supply chain challenges.

And so, we recognize that certainly there are questions out there, and we are eager to have the opportunity today to clarify that.

Mr. STANTON. That's right.

Mr. Spear?

Mr. SPEAR. Well, they are skills. We are teaching drivers to operate at a much higher level. These are marketable skills. These are portable skills. But we are enabling these drivers to be more aware, more responsive.

Some of the most basic things that we have talked about, like automated emergency braking, to adaptive cruise control, to more integrated systems, we are teaching not only the drivers, but the technicians how to service this equipment.

These are all things that are going to allow increased pay. These are all things that are going to make this workforce more talented and marketable. These are all good things. We should not stymie innovation. We should encourage it.

So, that Federal framework that is performance-based is going to help our workforce by giving them more skills. The quality of life, too, I would point out is we lose \$74.5 billion a year sitting in traffic. That is 425,000 drivers sitting idle for an entire year. Connectivity, vehicle-to-vehicle, vehicle-to-infrastructure, these are

all things that will eliminate that congestion and improve the quality of life and also improve our economy.

So, there is a tremendous role for automation and connectivity to really impact our workforce as well as our economy.

Mr. STANTON. Similar question. Does the current workforce have the skills necessary to operate automated technology, or will fleets need to undertake significant retraining or recruitment of new drivers?

Mr. SPEAR. Yes, I would be happy to.

Listen, I think our workforce is very excited about giving them new skills. We are giving them an opportunity to optimize their performance.

If you are teaching a driver how to operate an 80,000-pound vehicle with more command, more control, more awareness, more responsiveness, they are going to be better at their job. The motoring public is going to be safer.

And I would incorporate equality between commercial vehicles and passenger vehicles. Two-thirds of the accidents that involve our trucks are caused by passenger vehicles. They are speeding, and they are texting. They are not paying attention and they are running into the vehicle.

AEB, connectivity, these are all things that are going to save lives. We want to take a massive cut out of those 40,000 fatalities. And we believe that our workforce being properly trained is going to have a measurable impact on doing just that.

Mr. STANTON. All right.

Mr. Farrah?

Mr. FARRAH. Congressman, I should just clarify that I think what is important to understand here that all of the jobs needed to maintain trucks today, these are ones that we still need in the future. But we also need additional jobs specifically at these companies. We need people that are helping to maintain the fleet, work with the technology.

What we see across the board with members of AVIA is that they are working very closely in their communities on training programs so that they can have that talent work for their workforce. And so, that is just another way we are adding more jobs.

Mr. STANTON. That is great.

Mr. Urmson, please.

Mr. URMSON. And just to follow off of that. So, concretely, we have worked with the Pittsburgh Technical College, where we have put in place a training program for vehicle service technicians. We have worked with Gallatin College, where we are working on sensor technician accreditation and education.

And then importantly, at the company itself, we have created pathways for folks to move from our operations team into other roles at the company, program management and other aspects of it, to create that mobility for these critical employees for us.

Mr. STANTON. That is great.

It looks like I ran out of time here, so, I will submit my final question for a written answer.

I yield back.

Mr. CRAWFORD. The gentleman yields.

Mr. Stauber.

Mr. STAUBER. Thank you very much.

Mr. Spear, I really appreciate you bringing up the fact that crashes involved—many crashes are a result of automobile drivers with texting and what have you. We have to recognize the danger of that. And I think that our professional truckdrivers across this country see it every day, and it is horrendous.

And having been a former police officer, I was to many violent crashes because of the inattentive drivers and texting. So, thank you very much for bringing that up.

I also want to take a moment to acknowledge that this is National Truck Driver Appreciation Week. Our truckdrivers are critical to our supply chains. They keep our economy afloat. They work around the clock to ensure that we want for nothing. And I am thankful to all of our truckdrivers, not just today, but every day, for their professionalism and their safety on the roads.

As we talk about automated trucking, it is important that development of this technology, I believe, must be done in consultation and coordination with our truckdrivers. They have years of experience driving millions of miles and certainly know what is needed for safety.

Now for my question.

Truck driving provides a great income and it is a great profession. We have many truckdrivers in Minnesota. But what would you say to someone who is concerned that this technology will limit their employment opportunities in the future?

Mr. Spear?

Mr. SPEAR. I would point out that we have a responsibility as an industry now moving 72.5 percent of the domestic freight in this country to meet economic demand. We are consuming more. We are adding more people to our economy that are going to buy more goods, and we have to move those goods.

So, as that gap grows between consumption and our industry's ability to move those goods to where they need to be—we have a gap. We have a gap of talent that we need to add. And if we can't add people behind the wheel, there is a role for innovation to play without displacing anyone.

So, I don't look at this through the lens of displacement. I think there is plenty of room for innovation to solve problems, improve safety, improve performance, quality of life. These are all good things for our workforce to grow into.

Mr. STAUBER. So, Mr. Spear, you would look that professional Minnesota truckdriver in the eye and say, "You will not lose your job because of automation?"

Mr. SPEAR. I would. I would. I wouldn't hesitate. In fact, I think it is going to empower that driver. Certainly levels 2, 3, 4 are going to make them more marketable, giving them better performance. These are all exciting inroads that we want to see in our industry.

If we were flooded with drivers, if we had an abundance of people behind the wheel, we would be having this conversation very differently than we are today.

But I do believe there is a role for innovation to play without displacing those drivers. I would look them in the eye and tell them, "You have got nothing to be concerned about."

Mr. STAUBER. Thank you.

Truck driving in Minnesota and many of the northern climates is—the weather changes suddenly. We can be in Minnesota, and all of a sudden, a snowstorm hits, like, immediately, and black ice.

You are smiling, Mr. Spear, because you have been there, and you have heard the drivers say that. And that is in all the northern climates.

But I know we are still early in the stages, but where does this technology stand with varying weather conditions like icy roads in northern Minnesota or black ice or fog right away? Near Lake Superior, the fog can come in and you can't see 20 feet in front of you. Where do you see that technology fitting in?

Mr. SPEAR. I think it is an evolution. I mean, technology is going to evolve.

I am smiling because I am from Wyoming. I have been to Minnesota, too. We have the exact same—we have 2 weeks of really good weather, and the rest of it is hit and miss.

Mr. STAUBER. We have 1 great week.

Mr. SPEAR. Yes. One? OK. OK. Well, we've got 1 week on you.

Look, I think there are a lot of variables beyond that. Wind. High wind. There are a lot of variables that have to be taken into account.

I think what these gentlemen are demonstrating is that they are properly testing this in environments that are conducive to the technology as it stands. We are running lanes in the Southwest. It is a very good environment from Texas to California to test this equipment.

And as it evolves, as it gets better and the performance can take into account these weather variables, you are going to see more of it operating in States like ours.

But I would defer to them on that. But I think they are doing this responsibly. They are doing it with Government hand-in-glove to make sure that we are getting it right and we are not putting anybody in the motoring public in jeopardy. So, I think it is an evolution.

Mr. STAUBER. And I think that it is comforting to know that you are bringing the professional drivers in for consultation and advice. I think that is a very good way to move forward.

So, I yield back. Thank you very much, Mr. Chair.

Mr. CRAWFORD. The gentleman yields.

Mr. García.

Mr. GARCÍA OF ILLINOIS. Thank you, Mr. Chairman.

And thanks to all the witnesses this morning.

The automated trucks that we are talking about this morning are way upwards of 80,000 pounds. They are massive, heavy, and not particularly agile machines. So, when crashes happen, the risks are immense, especially to the communities that they drive through.

As everyone here knows, Chicago is at the heart of our Nation's transportation network, and the district I represent, Illinois' Fourth Congressional District, is crisscrossed by major truck routes. Every day, huge freight trucks run through bustling neighborhoods, down streets that kids cross for school, and feet away from people's front doors.

So, with that, I would like to ask my first question to Ms. Chase.

It is my understanding that all a vehicle needs to do to comply with existing Federal legislation is, one, have basic operating equipment—we are talking about a steering wheel and pedals—and two, report certain incidents to the NHTSA.

Am I accurate in saying that is about as much oversight as the Federal Government would have?

Ms. CHASE. Yes, sir. You are correct.

And if I could give an example of what is needed, a standard that is needed.

Right now, when a person goes to get a driver's license or a CDL, you have to take a vision test. So, with a truck taking over this capability, there are no current requirements that it be able to see and respond to the roadway environment like a human does now.

And while my current panelists have great promise, they are speaking about great promise for this technology, we are not there yet. And we don't know—we need the assurance of Government regulations to make sure that it can be accomplished safely.

Mr. GARCÍA OF ILLINOIS. So, it seems that those regulations don't address the fact that AV trucks don't just rely on steering wheels or pedals. Instead, they use a set of systems to make sophisticated decisions about the driving environment.

Given that, do you think that the same basic measures can be used to adequately regulate automated commercial vehicles?

Ms. CHASE. I think that we need new, additional safety standards when we are talking about automated trucks.

These are very sophisticated systems, and they can be prone to cybersecurity hacks. They can be prone to multiple disengagements and different problems on the roads.

So, without the assurance of set standards, we don't know how they are going to perform. One company might do a great job. Another company, not so much. And it is the motoring public that is put in danger if we don't have that security.

Mr. GARCÍA OF ILLINOIS. So, of course, truckdrivers—who are noticeably absent from this witness panel so far—are the ones with the actual experience and expertise in the cabin.

How can regulators ensure that workers have a strong voice in regulating the deployment of new technology, since they are the ones actually using them?

Ms. CHASE. Oh, I think all stakeholders should be involved in this process.

In fact, one of the best things that I have done during my tenure at Advocates is I did a ride-along with a truckdriver, and I experienced what it was like to be on the road. And it is such a different perspective than a car driver. You are so much higher. There are so many more responsibilities. And that voice is essential to have in the room to share what their experiences are on the roads.

Mr. GARCÍA OF ILLINOIS. Thank you.

I am trying to squeeze one more question in. This one is for Mr. Farrah and Mr. Urmson, if you can be brief.

Earlier, I spoke about the huge size of these vehicles and the correspondingly huge risk to nearby communities. But it is not just the size of these trucks that presents a danger, it is what is inside them, too. We have all seen stories of crashes and truck explosions



sending toxic fumes high into the air, forcing entire communities to evacuate.

Should driverless vehicles ever be used to transport hazardous materials?

Mr. FARRAH. Congressman, thank you much for the question. I will try and be brief here.

First, I think that I would like to follow up for the record with some additional information about requirements that are needed both at a Federal level and State level. This is a highly regulated industry. I think there is a little bit of context that we need to provide.

Second, I am not aware of companies that are doing placarded hazardous material delivery at this point. Certainly, I understand that that is, again, a very highly regulated space and would happy to follow up with you and talk about that further.

Mr. GARCÍA OF ILLINOIS. And Mr. Urmson?

Mr. URMSON. Yes. I would say—again, I would characterize that the regulatory environment is a little different than as was expressed. I think it is important to understand that the Federal Motor Vehicle Safety Standards exist and apply to these vehicles and this is a regulation with hundreds of pages.

And there is an ability for the Federal Government to exert to remove vehicles from the road if they create unreasonable risk on the roadway. And so, that is there and is a backstop as needed.

Mr. GARCÍA OF ILLINOIS. Thank you.

And I yield back, Mr. Chairman.

Mr. VAN ORDEN [presiding]. Thank you, Mr. García.

The Chair now recognizes Mr. Edwards for 3 minutes.

Mr. EDWARDS. Thank you, Mr. Chair.

Mr. VAN ORDEN. Correction. Mr. Edwards, I am sorry. You are recognized for 5 minutes.

Mr. EDWARDS. All right. Thank you.

Ms. Chase, I can't help but think as you made your comment about you doing the ride-along with a truckdriver: My dad was a truckdriver. And so, as a child, I have done hundreds of thousands of miles as a ride-along. And it is a very interesting perspective, that way of life.

Mr. Urmson, I am curious. I am trying to visualize how these trucks would operate. And it seems like—because there are some really fine maneuvers at the end of the line that would be required.

At what point does the automation end and someone climb in the cab and start doing the fine turns and that sort of thing that would be required to get to the final destination?

Mr. URMSON. Thank you for the question.

The technology we are developing today—the Aurora Driver—will basically drive gate to gate. So, it will leave a terminal, get through the industrial park, onto the freeway, head down the freeway, come off, and get into the terminal through the industrial park.

Mr. EDWARDS. You say “terminal.” Is there, like, a certain parking place? At some point, it seems like somebody has got to get behind the wheel and start working that thing around to a dock.

That requires a very specific skill. I have watched my dad and many others do it over and over again, and it looks impossible. I

have a difficult time imagining a machine or any sort of automation being able to do that.

Mr. URMSON. Yes, it is an incredibly skilled job and really important, obviously. And, yes, we expect the Aurora Driver to deliver the truck and the trailer—or the tractor and the trailer to the yard, and then someone at that point will maneuver it in the yard to take it to the dock.

Mr. EDWARDS. Gotcha. Thank you.

Also, this question is for you, Mr. Urmson.

China is America's lead competitor in the race to automated vehicle technology. For hundreds of reasons, not the least of which is the valuable data collected and transmitted by this technology, it is imperative that the U.S. maintain our lead.

Is there anything inhibiting America's development of autonomous vehicles that may assist China in deploying their technology before the U.S.?

Mr. URMSON. I do believe we are leading today, but that lead is fragile. Again, I think that there is an opportunity to harmonize regulation across States. I think taking a strong voice of support from the Federal Government and obviously oversight from this committee of agencies like FMCSA and NHTSA and help encourage them to put in place ultimately performance-based regulation is the right step.

Mr. EDWARDS. And so, specifically, what would you recommend Congress be able to do to help secure America's place at the forefront of this technology?

Mr. FARRAH. I would be happy to weigh in there, Congressman.

I think that one big piece of this—and first of all, I completely agree with you. We are very aligned on the idea that China is our nearest competitor here. We need to make sure that we are all rowing in the same direction.

One big thing that Congress can do is we would like to see FMCSA take action on a notice of proposed rulemaking specific to autonomous trucking. We think this is something that there should be very strong bipartisan support for.

This is something where there are certain open questions in the industry that we would like to see clarified that will give a lot of confidence so that our members can continue to make significant capital investments, technological advancement investments, to make sure, ultimately, this technology moves forward in the United States.

Mr. EDWARDS. And so, I will direct this next question to Mr. Urmson. And if you feel somebody else on this panel is more qualified to answer that, please point us in the right direction.

It seems like this technology will require a significant investment and that, most likely, it will be larger companies that will be able to take advantage of it and that smaller companies and startups could maybe be crowded out.

Can you give us any perspective on how you might see small businesses, small operators, and startups affected by this technology?

Mr. URMSON. Certainly. And as a company that has fought to be an independent company and grown from 3 people now to 1,800, certainly value that.

And I think that independence is absolutely critical, because a large company has some mission, and it may not be and it almost certainly isn't delivering the benefits of this technology. And so, that independence has allowed us to operate and build what we think is going to be a very important business.

As we bring the Aurora Driver to market, we are intending to bring it to market in a way where you will be able to buy a truck, and then you will have a subscription to the Aurora Driver. And so, it reduces the capital needs upfront in getting access to this technology. And we hope that that will help everyone get benefit from it.

Mr. EDWARDS. Thank you.

Mr. Chair, I see my time is up, so, I yield back.

Mr. VAN ORDEN. Thank you, Mr. Edwards.

The Chair now recognizes the gentlewoman from Nevada, Ms. Titus, for 5 minutes.

Ms. TITUS. Thank you very much.

As you heard, I represent Nevada. And for over three decades, the Federal Government has left open the possibility of Yucca Mountain, and that means a lot of hazardous, high-level radioactive waste would be transported on trucks. Some might come on trains, but most will probably come on trucks.

I wonder if you could maybe address if driverless vehicles should be allowed to carry hazardous materials, especially something as dangerous as nuclear waste. Anybody.

Mr. Urmson, or—

Mr. FARRAH [interrupting]. Congresswoman, I will start.

First of all, thank you for your leadership on autonomous vehicles in Nevada. You have certainly been a national leader on this issue. I was just—

Ms. TITUS [interrupting]. [Inaudible] Out front on getting something through the legislature on autonomous vehicles. Thank you for mentioning that.

Mr. FARRAH. Absolutely. Yes. And certainly, your State is seeing a lot of the benefits of that already.

I would say, I am not aware of companies that are in the hazardous material space right now. I understand there are additional regulations that come with moving that, and so, we would obviously need to comply with that. Happy to give you a sense of the market developments as they play out.

Ms. TITUS. Thank you.

Anybody else?

Mr. SPEAR. I would just say that, Congresswoman, when you look at hazardous materials, if you look at livestock, if you look at produce, there are certain things that can fall prey to certain conditions. So, extreme heat, as you are well aware of in your State.

I also am not aware of anybody that is operating autonomously with respect to hazardous. I think there are a lot of applications that are going to come last once that technology has been fully adopted and deployed before we see it applied to things like hazardous materials, livestock, produce, things that are going to require the attention of a driver.

There are just conditions that unfold unexpectedly that are going to need that driver's attention, which is why I think we are all say-

ing that we need to work with our current and future driver force to make sure those applications have eyes on.

Ms. TITUS. Thank you.

Ms. Chase?

Ms. CHASE. Absolutely not. Hazardous materials should not be transported by autonomous vehicles that are unproven, untested, and still unreliable. It is, frankly, scary enough to think about an 80,000-pound truck being driven autonomously. Think about putting hazardous materials in it. It could be catastrophic.

So, until we have the regulations and the safeguards that are needed put into place, there is no way that hazmat should be transported autonomously.

Ms. TITUS. Thank you.

Commercial trucks have to follow a lot of regulations and report a lot of data on safety. With the driverless vehicles, what kind of data should be reported and who should have access to that data?

Mr. URMSON. So, I can just talk about what we report today. So, we report to Federal and State officials. We are very transparent about it.

As part of the standing general order, we have reported three incidents with our trucks. Two of them were incidents where debris was thrown up and from the road by another truck on the road and hit one of our vehicles.

The third was an incident where we believe the operator of a light vehicle dozed off for a moment and then sideswiped across multiple lanes, contacted our truck, and then went off. And, fortunately, everyone walked away. It's about as good a collision as you can have between a light vehicle and a truck.

In that situation, I think it highlights, again, the available data. And we have shared this. We actually posted this and explained it in the response. If you look at the state of the art today in understanding these events, it is something like a driver monitoring system.

And when you look at this event in that film, you have no idea what happened. At some moment, you see the driver tense, and that's it.

With our technology, we are able to observe that other vehicle move across multiple lanes of traffic. We see our vehicle respond or begin to respond, note the moment the collision occurred. Our vehicle immediately began its emergency response procedures. Our drivers very quickly thereafter took over to execute their response procedures. And we could—we understood exactly what happened. And, again, we have shared this transparently.

Mr. FARRAH. Congresswoman, I would echo what Mr. Urmson said about the standing general order. This is a robust data-reporting regime that the autonomous vehicle has lived under for more than 2 years.

This information is transparently available on the NHTSA website. This is something that policymakers can look at. Certainly, our industry shares this out whenever we can.

I think the other piece that is really important is that 23 States have proactively allowed autonomous vehicles on their roads. And so, in those States—including Nevada, where our members are op-

erating—there is a deep level of engagement with State departments of transportation, with police forces.

And so, this is something that is very much a relationship that we want to continue to have and something that I think we are very transparent about.

Ms. CHASE. I know you only have a few more seconds, but I just want to add that we think there needs to be even more transparency. The data collected by the standing general order is a step in the right direction, but there is a lot of redaction happening.

So, we don't really have a clear picture of what is happening on our roadways in terms of disengagements, crashes, and other incidents on the roadways.

Ms. TITUS. Thank you.

It is something we don't have time to talk about, but I wonder about liabilities. Is it the person who makes the truck? The person who is running the truck? The person who owns the truck? How is all that insurance issue going to be resolved? Maybe we can talk about that another time.

Thank you.

Thank you, Mr. Chairman.

Mr. VAN ORDEN. Thank you, Ms. Titus.

The Chair now recognizes Mr. Burlison from Missouri for 5 minutes.

Mr. BURLISON. Thank you, Mr. Chairman.

Mr. Spear, it was said that if we suddenly enter into the world where—or a situation where we do have driverless vehicles, that the jobs won't be displaced. Can you elaborate on how the industry has demand in other aspects?

Mr. SPEAR. We have long dealt with a shortage of talent, both drivers, technicians, beyond. COVID certainly inflated that. Now you are seeing all segments of employment dealing with shortages of employment.

And we need more skills. We need more people to fill these roles. And our ability as an industry to meet economic demand for the foreseeable future depends on attracting more talent into our industry, whether they are young talent replacing the aging retiring talent. This is an ongoing challenge that is going to impact our ability to move that 72.5 percent of the domestic freight.

That gap is widening between the demand and our ability to meet it. So, innovation has a role to play there. And developing driver-assist technologies into level 5 fully autonomous vehicles, we don't view that as a threat. There is plenty of room for both to play.

We are going to have to still meet that demand somehow, whether we can add that 1.2 million people over the next 10 years or we are supplementing it with technology. Either way, I would look any driver in the eye and say, "I do not believe your job is at threat."

Mr. BURLISON. Right. And none of it would happen overnight as well.

Mr. SPEAR. Correct.

Mr. BURLISON. Right? These kind of technological advances happened over generations.

Mr. SPEAR. Evolution.

Mr. BURLISON. If you look at the advent of the—one could ask the question, should Eli Whitney have not invented the cotton gin?

Because think about how many workers were displaced ultimately over generations by the advent of technology like that. Or harvesters.

I mean, your ancestors, more than likely, were farmers. Mine were. Everyone was farming because that was the only job there was and it took an enormous amount of labor.

But what they weren't able to do were things like go into insurance, go into banking. All the enumerable job opportunities or job titles that exist today did not exist 100 years ago when everyone had to be on the farm, correct?

Mr. SPEAR. That is right.

Mr. BURLISON. And so, to me, to deny the opportunity, really, the growth opportunity for individuals is what America is denying. The opportunity to go into the new frontier to see what—Mr. Spear, let me ask this.

If the United States didn't allow this, it's still going to happen technologically, correct, in other countries?

Mr. SPEAR. Absolutely. It is already happening, as we talked about, in China, been over in Europe. This is being developed and deployed. This is going to happen somewhere in the world, and it is going to put us at a disadvantage if we don't keep pace with it.

And so, developing it, innovating it, it has safety benefits. We need to do it right, though. We are not doing this haphazardly. It is an evolution, and it will take time. We need to do it responsibly, which is why we are having this hearing.

Create that Federal framework. Allow interstate commerce. Don't have a patchwork of requirements. Have a seamless 50-State standard on performance. Allow these agencies to work collaboratively with our industry and feed you, as the oversight committee, the information you need to make sure this is being done right, not only safely, but that we are not compromising our ability to compete.

We don't want to concede our standing in the world. We need to maintain it. We need to lead. Innovating is key to that.

So, if you want to compete, work with us. We will work with you. And developing that standard will go a long way to doing just that.

Mr. BURLISON. Thank you.

Mr. URMSON, you are with Aurora. I wanted to kind of geek out with you about the technology, if that is OK.

So, this is often—it is developed in a—is it available in a cloud environment and then is downloaded to the client side for vehicles?

Mr. URMSON. Yes. So, the Aurora Driver—first, thank you for the question.

The Aurora Driver is a combination of software and hardware, and we have to work closely with our OEM partners who make the trucks so that we can plug it in.

Mr. BURLISON. And your technology is getting better and better and better?

Mr. URMSON. Consistently better.

Mr. BURLISON. Probably at an exponential rate, correct?

Mr. URMSON. No, it certainly was not an expert to begin with, but at this point, we are driving very well down the freeway.

Mr. BURLISON. And the question—I think that we are likely to end up in a day where—and you can—someone can chime in on

this if they like—where the vehicles will be driving statistically more safe than a human being.

And I have a feeling there is going to be a point in time in which insurance companies actually charge a premium to individuals who choose to drive their vehicle themselves.

Mr. URMSON. And I think we are already starting to see some of the signs of this. I talked earlier about the benefits that we have seen where we have taken the Aurora Driver and simulated how it would have responded to 29 fatal collisions that happened where we expect the technology to first launch, and it would have avoided all of them. And that is 29-plus families that wouldn't have lost a loved one. I think that is incredibly important.

Mr. BURLISON. Thank you.

Mr. URMSON. Thank you.

Mr. VAN ORDEN. Thank you, Mr. Burlison.

The Chair now recognizes the gentlewoman from Ohio, Mrs. Sykes, for 5 minutes.

Mrs. SYKES. Thank you, Mr. Chair.

And thank you to our witnesses for your testimony. You have had some very fascinating discussions, including the importance of fostering American leadership here in this field to the potential to save drivers' lives, which is a goal that we all have, and certainly the fuel cost savings, which is important.

And I am from Ohio. We have the seventh highest amount of centerline miles in the country, so, there is a lot of trucking and just transportation generally going through our State.

And all of these are really important, and I really want to focus on the safety of our citizens here and the public safety.

In particular, I had a meeting with some local elected officials, and one of the township trustees from Macedonia Township back at home who is a former law enforcement officer highlighted the many trucking accidents that he saw in his profession, former profession, where heavy trucks were part of crashes, and death and destruction followed. And he talked very graphically about what it was like for him working on that and shared concerns with the increasing weight of trucks and how that impacts these crashes.

And so, if you could talk a bit—and maybe, Ms. Chase, this is a question for you—about the safety of autonomous trucking with these very heavy trucks and what does that mean when our law enforcement officers or individual citizens are potentially impacted, literally and physically, because of an accident that might happen on a highway or a roadway.

Ms. CHASE. Thank you so much for your question. And thank you especially for bringing up the perspective of law enforcement and crash victims. I think those are two essential voices to have when we are talking about truck crash safety and also autonomous trucks.

So, when we consider autonomous trucks, we really need to think about a number of factors, including the roadway environment, the skill level of a safety driver behind the wheel, and also the different impacts, such as weather and some issues that have been brought up today.

I want to talk about what you just raised, which is truck size and weight. You can't defy the law of physics. If you have a heavier

truck, then there is going to be more of an impact if and when a crash occurs.

So, I think it is really incumbent upon our leaders to pay attention to when special interests are asking for exceptions from truck size and weights, that there is a very real-world consequence when these trucks are made heavier, and also in the realm of autonomous trucks.

Mrs. SYKES. Thank you for that answer.

And, again, staying on the topic of the human element here. A couple of weeks ago, I introduced an amendment, a bipartisan amendment, to ensure that there was signage, signs in new builds to acknowledge human trafficking. And sometimes our truckers are a first line of defense against human trafficking.

Unfortunately, in Ohio, we have seen a lot of it, probably just because there is so much transportation going in and out of our State. But I know that we will lose some of that if we do not have human beings engaging in this in the same kind of way.

But I want to pivot a little bit for the sake of time because there is a little bit of conflicting evidence about how this will impact people's jobs and whether or not we will see a significant reduction in trucking employment. And I have my thoughts, but I want to hear it from all of you.

Again, I represent Ohio's 13th Congressional District, and hundreds of workers in Copley and Richfield were recently laid off by Yellow when they shut down abruptly last month.

And so, my question to really anyone who is willing to answer it is, can you truly look me in the eye and tell me with any degree of certainty that we are not going to lose jobs, thousands of good-paying jobs in Ohio's 13th Congressional District in Ohio and across the country due to autonomous vehicles?

Because we are, all of us as Members of Congress, we have to ensure that we have the space for and an environment for jobs. People are talking to us all the time about jobs, how much things are costing. And if people don't have a job, they obviously cannot pay for the goods and services, the rent, the drugs, and the prescriptions that they need.

And it makes me uncomfortable to go back home and to look at truckers who have just been laid off to say that we had a hearing on autonomous vehicles knowing that they need to be absorbed into another trucking company, but Congress, instead, is looking to automate their jobs and they may not have anything to go to.

So, if anyone has a response. I am sorry. I know I took up a lot of the time here, but happy to hear any response we have in the next 6 seconds.

Mr. SPEAR. I quickly will look you in the eye and tell you that displacement is not a concern. We see zero evidence of that. Other than baseless rhetoric and emotion, we are not seeing any evidence of that.

And the reason is that we have a shortage of talent, and it is a growing shortage of talent. As long as that exists, innovation has a place to thrive in terms of supplementing our industry's ability to meet economic demand.

I would also point to a 2021—



Mr. VAN ORDEN [interrupting]. The gentlewoman's time has expired.

The Chair now recognizes Mr. Williams from the great State of New York for 5 minutes.

Mr. WILLIAMS OF NEW YORK. Thank you, Mr. Chairman.

My discussion really is about technology. So, Mr. Urmson and Mr. Farrah, I would focus it on you, but Ms. Chase and Mr. Spear, please contribute as you like.

I am very concerned about that we are able to maintain America's leadership in automated vehicles. This covers many domains, including air and commercial vehicles like we are talking about here, as well as cars and trucks that we drive every day.

There are a lot of good issues that have been raised today. It is employment, workforce readiness and availability, safety. All of these kinds of issues are absolutely relevant to this conversation. Certainly small businesses, mom-and-pop trucking companies, lots of important things have been discussed.

But my focus today is really to draw attention again to America's leadership and specifically ensuring that we have a strong supply chain here in America to support the growth of this industry.

Simply put, I want American workers building automated vehicles in America, and I want them supplied with American components that also are built right here.

And one of the key things that I would like to focus on specifically is the amount of data that is generated by automated vehicles. I have often heard them described as rolling data centers. There is a quote from a former CEO of Intel who said that automated vehicles will generate 4 terabytes of data per day, and I can say that that's 16 times more than the storage I have on my relatively modern iPhone.

That's a lot of data, and we are seeing that actually pervasive throughout our entire economy and throughout the digital economy.

There are a number of kind of chips that go into these vehicles. Some cost just a few cents. Maybe it is in our cars today, like an oxygen sensor. But increasingly, we have very sophisticated computer chips required to process artificial intelligence, machine learning, very complex calculations in realtime, certainly for safety.

But along with that, and as you may know, if I can point again to some common standard, like our iPhones, we have a chip, a logic chip, if you follow that kind of thing, an A7, an A8, whatever the latest is. But then you have storage and memory. And I really want to pay attention to not only the amount of data that is being created, but how it gets stored and processed.

So, can anyone really address the challenge of dealing with this amount of data that is being generated by this innovation?

Mr. FARRAH. Congressman, thank you very much. Maybe I could begin. If others want to chime in.

I think there are a few very important themes that I really want to echo that you said. I think the first is around American leadership. The reality is, is that we are in a dogfight with other countries in terms of making sure that we are the leaders in this space.

I think that what comes along with America leadership here is making sure that we do have the leading companies here in the

United States, we have a robust supply chain that can supply a lot of those companies, we have the right employees that can ultimately power a lot of these going forward. And so, that is—

Mr. WILLIAMS OF NEW YORK [interrupting]. The part of that that I am focusing on is specifically around data. So, I am trying to drive the conversation specifically around the data component. Just happens to be of interest to me.

Mr. FARRAH. And certainly you are correct that these AVs are ultimately gathering a lot of data, using a lot of data. The computing power is obviously tremendous. And so, the industry is very committed to making sure that we are protecting that, making sure that we have the ability to deal with things like privacy, deal with issues with law enforcement. That is a core value of the industry.

Mr. WILLIAMS OF NEW YORK. As part of this, when we get back to safety, are you aware of any requirements or discussions about requirements that require maintaining the integrity of this data and the safety of this data in the event of a crash?

One of the things that is critical, like black boxes for airlines, is that all of the lidar sensors, the motion sensors, video, all the things that are being generated on these cars or vehicles in realtime, is there any requirement to save that in the event of an accident?

Mr. URMSON. I don't know if it is a requirement, but it is absolutely in our interest to.

These vehicles—I talked earlier about an event where we were sideswiped by another actor on the road. From that, we were able to understand that the vehicle behaved appropriately, or at least our vehicle behaved appropriately, exactly when the event occurred, all the situation around it. And it allows us to both make our system better and better understand the events that happened.

Mr. WILLIAMS OF NEW YORK. Thank you all for your time. I know that many of you will be traveling by aircraft, and I would just point out that those aircrafts are highly automated and that the pilots do very little, even all the way to approach.

So, I think if you trust your air travel with automation, I think we can probably trust our road travel with automation in the future.

Thank you.

Mr. VAN ORDEN. Thank you, Mr. Williams.

The Chair now recognizes Mr. Moulton from the great State of Massachusetts for 5 minutes.

Mr. MOULTON. Just continuing my colleague's line of questioning. How many Americans have died in major passenger airliner crashes in the last 5 years?

Mr. FARRAH. Congressman, I am not aware of that—

Mr. MOULTON [interrupting]. The answer is zero.

How many people have died in Tesla crashes attributed to automation in the last 5 years?

Mr. FARRAH. Congressman, I am not familiar with that, but I can tell you that—

Mr. MOULTON [interrupting]. I can tell you that it is a lot more than zero.

Mr. FARRAH. I am sorry?

Mr. MOULTON. I can tell you it is a lot more than zero.

Mr. FARRAH. And that is a different technology than we are talking about.

Mr. MOULTON. Mr. Urmson is nodding his head there, right?

So, the idea is that we are safe traveling on automated planes and yet, therefore, we should assume we are safe traveling on highways with automated vehicles is just plain wrong by the facts.

I am concerned about the fact that a lot of people get in their Teslas assuming that they can push a button and they will have fully autonomous driving.

I asked some questions about this at an earlier hearing. And it was explained by the witness that there is a big difference between the actual capabilities of a Tesla, which he said was about level 2, versus the level of 4 or 5 automation that, unfortunately, a lot of Tesla drivers assume they are getting when they push that button.

How do we address this major discrepancy where people get in a car, think they can be driven by themselves, and yet actually they are choosing an option that is not only dangerous for themselves but for other people on the highway?

Mr. URMSON. So, I share your concern. I thank you for the question, and I think it is a very astute observation that a lot of people do not understand the difference between the technologies.

And I think there is an opportunity for the Department of Transportation to continue their campaign in education around the difference between driver assistance technologies, which are what we believe is in the Tesla product, and fully automated driving is what we are talking about developing.

At Aurora, we take that safety responsibility very seriously. We have shared transparently our approach to developing a safe system. It is a holistic approach that spans from proficiency where we—

Mr. MOULTON [interrupting]. I am sure you are taking—I can tell you are taking this seriously, and I appreciate that very much.

Look, I have some obvious concerns about people who are dying on the road because of this technology perhaps being deployed too soon. But another one of my concerns is that we don't win this race and China wins this race.

And we have to balance these two concerns. We want to see American companies develop this technology and set the standards for the world. We want to see them do it in a way that is safe for the American traveling and walking public.

What are some of the threats that you are concerned about with Chinese lidar technology? I mean, I sit on the Armed Services Committee. I sit on the Chinese Communist Party Select Committee. I don't like the idea of very intricate mapping data of our roads, video of our American people being transmitted back to Beijing on an hourly basis because we have Chinese cars that have full data links up to the PRC operating in America.

And I am delighted to hear from anyone on this subject.

Mr. URMSON. So, I can talk a little bit about what we do at Aurora. So, we have a committed cybersecurity team. It is about 50 people that focus on that. We have done assessments of our technology and don't see data leaking from it.

Furthermore, we have invested heavily. We acquired a company in Bozeman, Montana, about 4½ years ago at this point, where we

are developing next-generation lidar technology to enable our vehicles. It is actually a critical technology.

We heard earlier questions about being able to—the challenges that come with operating a large vehicle at speed or a heavy vehicle at speed. That means you have to see further down the road. That is why truck cabs are so high.

This lidar, we call it FirstLight, enables us to see far enough to actually drive safely in these conditions.

Mr. MOULTON. Let me ask another question about your vehicles. Am I correct that a typical tractor-trailer weighs about 16 or 17 tons? Is that about right?

Mr. SPEAR. Well, the Federal limit is 80,000 pounds.

Mr. MOULTON. Right. So, that is when it is loaded, right?

Mr. SPEAR. Are you talking about empty?

Mr. MOULTON. Well, just the vehicle itself.

Mr. SPEAR. Oh, the tractor?

Mr. MOULTON. Yes.

Mr. SPEAR. Yes.

Mr. MOULTON. OK.

How much do AVs with electric vehicle technology, are they going to weigh more or less?

Mr. SPEAR. Two batteries power a fully loaded tractor-trailer, 8,000 pounds each, so, about 16,000 pounds, which, by the way, counts against the payload.

Mr. MOULTON. Counts against the payload, right. So, for a full truck, you are going to have trucks that are about the same weight, but they are going to be able to carry less goods.

Mr. SPEAR. That is correct. So, you are going to need more trucks, more drivers. Another role for innovation.

Mr. MOULTON. Do you think that they should pay higher road fees because of the additional damage they are doing to our highways?

Mr. SPEAR. Not if you are not exceeding 80,000 pounds, no.

Mr. MOULTON. But if they are traveling empty and they weigh twice as much or three times as much?

Mr. SPEAR. No different. They still pay their road fees. We are paying half the taxes to the Federal Highway Trust Fund already.

Mr. MOULTON. It doesn't surprise me that you don't think they should pay higher fees, but they are doing much more damage.

Mr. SPEAR. No, we are happy to pay higher fees. We lobbied for an increase in the gas tax. That is our shop floor. That is where we do our business. So, we get a great return off of having good roads and bridges. So, less damage to the vehicles, we are all in on that. So, we are willing to pay more in return.

Mr. VAN ORDEN. The gentleman's time has expired.

The Chair now recognizes—

Mr. MOULTON [interrupting]. Thank you.

Mr. VAN ORDEN. Absolutely.

The Chair now recognizes Mr. Van Drew from New Jersey.

Dr. VAN DREW. Thank you, Chairman.

Thank you all for being here.

So, a couple thoughts. And I know everybody likes to philosophize while we are up here, but you can't help it. It is part of the job.

But, Mr. Spear, when you say that small truckers, you can look those folks in the eye and say that their job is always going to be there, and I say this—I don't know you, so, I don't say this with any aspersion at all to you.

In all my years of being in Congress and being in the State senate, I had a lot of people look me right in the eye and say something wasn't going to happen, and it sure did.

As the years go by, it is going to be cheaper for you to do it automated eventually, and it is going to be maybe easier, I don't know, because we are going to have to see what the outcome is. But I feel we are losing small businesses in this country at every level.

Mr. Burlison talked about farms. And, yes, I know that now people can do other jobs. But a lot of people liked having a small family farm. They can't do it. Lots of folks have their small trucking companies. I have 93 towns. One of them, Vineland, has a number of small trucking companies and family-owned through multiple generations.

That, in reality, if you look into the future, if we are not careful, is the way this is going to go.

Do you ever envision AI taking care of all the services that these trucks will need as far as tuneups and the basic things that have to be done to vehicles?

Mr. URMSON. So, I can talk—

Dr. VAN DREW [interrupting]. Yes. Whoever wants to answer.

Mr. URMSON [continuing]. If that is OK. Thank you for the question.

And this is why we are actually investing in training and accreditation programs. So, we work with the Pittsburgh Technical College where we are working with them to develop training for vehicle service technicians for this industry.

We are working with Gallatin College in Bozeman, Montana, to develop sensor technician training and development.

So, we are trying to help develop the upscaling for the workforce of the future.

Dr. VAN DREW. OK.

In the future, do you ever anticipate that—I mean, after you are gone and I am gone, I will be gone first—there will be a time when everything will be automated, including the service work that needs to be done and everything else?

I mean, if we can drive huge trucks on the road automated, I don't know why we couldn't do the service automated.

I mean, literally, do you picture a time, generations in the future, where you will be a totally automated company, and there will only be corporate leadership that will be human?

Mr. URMSON. I don't think my imagination is that big, but what I would reflect on is that if I think back to a time well before me, the 15th century, the 16th century, I think the folks looking forward to the jobs of today wouldn't even be able to fathom them. And I would expect that there is going to be incredible new opportunities that are afforded by innovation and by America leading the way with that.

Dr. VAN DREW. One point I would make, too. We spoke about airplanes, and they are automated to a great degree. There are always two pilots still in the plane.

And that is what concerns me. If we were automating but there would still be somebody, a human being that knew how to drive a truck in the truck, that is one thing. But the fact that we are just going to have these trucks without any human assistance, other than at the terminals, still concerns me.

Deadly crash—and I know it is different. And I know the system is different. But still, Tesla, again, folks looked you in the eye and said, “Man, there are going to be no problems at all.” And their vehicles have failed. There was one instance where they failed to see a tractor-trailer in the sun, and an Uber car in Tempe, Arizona, struck a pedestrian after failing to identify her, and that is only a few of the issues.

And I associate myself with some of the comments you made, Ms. Chase.

These examples highlight the safety risks that we still do have, and we have to go carefully, and we still have to incorporate—and I know the words are easy in Congress, but the reality—the truck-drivers who have made their living through generations, and small business. I mean, small business is going to become nonexistent if we keep going this way in America.

American truckers deserve clarification, and that is what we are trying to do here.

And it is funny, and other people have mentioned it, we are in the middle of National Truck Driver Appreciation Week, but yet we are having this conversation of how—and I know you wouldn’t say that, and I know you don’t think that—we can do away with truck-drivers in reality.

Let me say this. I have a few questions, and I guess I know one answer. Real quick, just because I know we are going to run out of time.

Do you believe autonomous is safer than the truck-driving human being driving the truck? Yes or no?

Mr. FARRAH. Congressman, I will just answer very briefly, seeing that we are out of time here.

I think that the exciting thing is what we see now from the data that is coming out, as our members are reaching certain thresholds, is that we are improving against the status quo. That is important. It is important to keeping roads safe in the United States. It is something we are very proud of.

Dr. VAN DREW. One question I am going to not ask you, because I know our time is up, but I will send in writing.

Is this going to save the companies a great deal of money ultimately?

So, I thank you for being here.

I yield back.

Mr. VAN ORDEN. Thank you, Mr. Van Drew.

The Chair now recognizes my friend, Mr. Carbajal, from the great State of California.

Mr. CARBAJAL. Thank you very much, Mr. Chair.

First of all, from the outset, I want to say how exciting this technology is and the innovation and the promise that it has for society in transforming many aspects of what we do, especially in reducing cost.

But then we have the safety issue. And, quite frankly, that is what leads me to have concerns over how advanced driving-assistance programs are being marketed to consumers.

Recently, a constituent of mine took me on a drive with one of these full self-driving Teslas, and it was alarming to see failure after failure after failure. And so, it raises lots of concerns about safety and confidence in the technology and the ripeness of it.

So, Mr. Urmson, can you speak to why regulating level 2 and level 3 to 5 of driving automation together creates consumer confusion about the capability of technology?

Mr. URMSON. Thank you for the question.

And I think, again, that is a very astute observation, that these are just fundamentally different technologies. Driver-assistance technologies are developed with the intent of an operator being there, a driver being there, paying attention and getting assistance from it. And this is, to the best of my understanding, what the Tesla system is.

In contrast, we are developing a system that is able to take full responsibility for the driving task where we are not dependent on a lack of confusion between the driver and the vehicle to ensure safety and where we are developing with a much more, I believe, robust approach to safety.

Mr. CARBAJAL. It sounds like you are creating the gold standard.

How does Aurora approach interaction with local communities you are testing in, especially local governments and first responders?

Mr. URMSON. This is one of the areas where I am particularly proud of the way the company is engaged. We see that the stakeholder step that is involved in this is broad, and from day one we have engaged at the Federal level, the State level, the local level. We work with emergency and first responders in the communities we operate.

We have a gentleman on staff who had, I think, 30 years of experience, Gary, in law enforcement.

One of the shining examples of the collaboration we have put in place is our trucks operate through an inland Border Patrol station in Texas. We are the first company that can do that autonomously. And together, that was us and the CBP coming together to figure out a process to integrate this technology safely into their existing processes.

Mr. CARBAJAL. Thank you.

Mr. Farrah, the National Highway Traffic Safety Administration, NHTSA, has issued a standing general order on AV crash reporting, requiring manufacturers of fully and partially automated vehicles to report crash data.

Do you support the continuation of this standing order? And would you support its expansion to include additional information, such as on disengagements or transfer of control to a human driver, to help the public, the consumer, better understand the reliability and safety of automated vehicles?

Mr. FARRAH. Congressman, thank you very much for that question.

I think that I have come back a few different times during this testimony to talk about the importance of the standing general

order, the transparency of the data. This is something that we are very proud of the safety record that is presented. There are certainly improvements that can be made to the SGO in terms of what gets reported, how it is presented to the public, so there isn't a lot of confusion out there.

And so, there may be refinements. But certainly this is something that we understand the importance of it and expect it to continue.

Mr. CARBAJAL. So, you support that?

Mr. FARRAH. We support having the data presented. We think there might be opportunities to improve how it is done.

Mr. CARBAJAL. Thank you very much.

Mr. Chair, I yield back.

Mr. VAN ORDEN. Thank you, Mr. Carbajal.

The Chair now recognizes Mr. Burchett from the great State of Tennessee.

Mr. BURCHETT. Thank you, Mr. Chairman.

Mr. Farrah, a recent report found that 84 percent of automakers surveyed share or sell personal data. Should Americans worry that automation of commercial vehicles will further compromise our privacy?

Mr. FARRAH. Congressman, I certainly appreciate the question.

I don't think that they should be. I think that the companies within our organization are incredibly motivated to safeguard that data. This is data that is important for the performance of the vehicle. That is going to make the roadways safer for your constituents.

And so, I think there is a very strong alignment between what the industry is doing to improve roadway safety but also with those that care very deeply about privacy, as you do.

Mr. BURCHETT. Well, I appreciate that answer, but still, they are sharing that personal data, and some of that data has very little, I feel like, to do with automobile or safety on the road.

I am wondering will we be able to—and we know what they are sharing. And some of that stuff I have seen is just not—to me it just doesn't share any of those attributes that you said. So, I hope—we are going to hold you to that. I hope you are aware of that.

Let me ask you to switch gears a little bit.

Can the Federal Government improve regulations to support private-sector innovation investment?

Mr. FARRAH. Congressman, they absolutely can. I think one thing that we have noted today is that I think that there is a very strong need for FMCSA to move forward on an autonomous trucking-specific rulemaking. This is something there should be bipartisan support for that.

What we have right now is a situation where our industry, private-sector capital, wants to be put to work. It wants to develop safer roads, ease the supply chain. There are certain issues that we would like to see tackled by the Federal Government, and that is a way that we can ultimately help the domestic industry to continue to invest that capital and create jobs.

Mr. BURCHETT. OK.



Mr. Urmson, sensor data is collected, shared, and used. How is that? How are you all doing that?

Mr. URMSON. Thank you for the question.

So, we gather data from our vehicles to support the development and improving the safety of the system. That data stays within our company. We have in place—well, we are compliant with the required privacy policies around this, privacy rules. And we have procedures in place to respond to law enforcement requests as well.

Mr. BURCHETT. I don't trust the Federal Government getting a lot of this information. How can I trust you all?

Mr. URMSON. I think it is in our interest to protect this data. We are investing a significant amount of money to develop the technology, and intellectual property is core to our success.

Mr. BURCHETT. OK. Have any of these privacy concerns been brought to your attention related to sensor data?

Mr. URMSON. I am certainly aware of the general set of concerns around it and certainly share them.

Mr. BURCHETT. What steps are you all taking to protect operational systems, software, and data cybersecurity?

Mr. URMSON. Thank you for that question.

We have a dedicated staff of cybersecurity experts. It is about 50 people that are working to both secure our corporate infrastructure and also secure the product. We, obviously, as I said previously, our intellectual property is critical to our success, and so, it is very much in our interest to protect it.

Mr. BURCHETT. Mr. Spear, what is the ATA doing to ensure automated commercial motor vehicles are not vulnerable to cyber attacks?

Mr. SPEAR. We have a Technology and Maintenance Council, a Law Enforcement Advisory Board. We have worked closely with the Commercial Vehicle Safety Alliance to develop a program called CyWatch, and it is built on protocols and guidance from DHS, DOJ, DOT. And those protocols are then shared with our membership: large, medium, and small.

So, we are setting those standards. We are sharing it. Creating those best practices is absolutely imperative. So, as we adopt more technology that could be subject to cyber attack, we want those protocols put in place.

We do monthly calls with the Administrator at TSA specific on cyber, and they are actually offering to train our staff. So, we have a better granular understanding for our mode, and those best practices then are, in turn, shared with our membership.

So, that collaboration is very robust, and I am very encouraged by that. We need to do more, but I do believe that we are doing the right things on this front.

Mr. BURCHETT. Mr. Farrah, how can we improve regulations that support the private-sector innovation investment?

Mr. FARRAH. Congressman, I think that the most important thing here is that as we reach this new age where autonomous vehicles are starting to be deployed on our roads, there are certain clarifications that we need from the Federal Government because a lot of the discussion that has taken place beforehand didn't necessarily include our industry.

So, this is going to be a key piece, and that will ultimately help to deploy more private-sector capital and create more private-sector jobs.

Mr. BURCHETT. Thank you, Mr. Chairman.

Mr. VAN ORDEN. Thank you, Burchett.

The Chair now recognizes Mr. Allred from the great State of Texas for 5 minutes.

Mr. ALLRED. Well, thank you, Mr. Chairman.

And thanks to our witnesses for being here.

I am glad that so many of the newly established AV companies have chosen Texas for their headquarters or for their pilot programs.

In addition to being a Member of Congress, I am a father of a 4- and a 2-year-old. And so, Ms. Chase, I have appreciated your testimony today.

To me, this conversation has to be centered around safety, because if you drive around Dallas or any of our big cities in Texas, you are going to get on the highway. And I have got two car seats in the back seat of my car, and the last thing I want is a big truck that is, for whatever reason, whether it is human error or through technological error, going to create a really dangerous situation.

And so, I have appreciated, I think, the kind of robust discussion about safety that we have had today, and I think that it is clear to me that you all are taking it very seriously.

I am on the Aviation Subcommittee as well, and we have American Airlines and Southwest Airlines in my area, and I can tell you that I think your standard will not be much different from theirs in terms of there is going to be a very low acceptance of any kind of automated risks here, just like in the aviation space where one accident has much more ripple effects throughout the entire industry.

And I am also the cochair of the Supply Chain Caucus, which we refounded, and I am glad to hear that Aurora is already testing freight loads along the I-45 route between Dallas and Houston. This is a vital corridor for our State, and efficiency is something that I think is really important when we talk about this.

And so, Mr. Urmson, I was wondering if you could just speak about any lessons that Aurora has learned so far from this route.

Mr. URMSON. It has certainly increased my appreciation for the complexity of logistics.

So, I, unfortunately, have never driven a truck. My parents didn't drive trucks. But that leads me into the place of the humility of making sure we surround ourselves at the company with folks who have domain expertise from various different areas.

And it was important to me that as we hired drivers into the company, that they were true employees, that they had equity, they had the same kind of benefits that the rest of us had at the company because they are so valuable to what we do.

And I think the insight we get from those drivers—I have taken the 11-hour journey in the truck from Fort Worth to El Paso. I have taken many times the 3-hour trip from Dallas to Houston. And just—

Mr. ALLRED [interrupting]. Three hours on a good day.

Mr. URMSON. I am sorry, sir?

Mr. ALLRED. Three hours on a good day. It can be longer.

Mr. URMSON. It could be, depending on traffic.

But it was really incredible to see how far ahead these drivers look. It led to that kind of insight of understanding how far you need to look ahead. It led to the investment we have made in lidar, in Montana, in this case, to develop that in America and to push the capabilities there.

So, it is really impressive to see.

Mr. ALLRED. Yes. That is great. Well, thank you.

Well, with so many AV trucking companies in the Dallas area, I am excited about the potential, as I said, for this technology to improve our supply chains, but also want to make sure that we are considering and discussing the potential impact of the technology on jobs.

And I know that Dallas College, which has campuses in my district, has been working with the AV industry, and I think with Aurora in particular, to envision a new workforce development program geared towards, sort of, the next generation of transportation jobs.

So, Mr. Urmson, Mr. Farrah, if you could speak to the kinds of AV trucking jobs you think this will create and how the education system can help prepare us for the workforce of the future in this area.

Mr. URMSON. Thank you for the question.

Yes, we are very excited to work with Dallas College. We already work with Gallatin College in Montana, and we work with the Pittsburgh Technical College in Pennsylvania on different elements of this in developing the workforce.

It actually is fascinating. We have talked a lot about displacement, and the story that comes to mind for me is what happened with automation in the banking industry. So, everyone was worried that as automated tellers took place, there would be no job for tellers anymore, and, in fact, the opposite has occurred.

Because it reduced the friction of delivering the service, it allowed people to be in better value-added jobs, and it created more of them.

So, in this space, we see more opportunities for service technicians. There are going to be more things on these trucks to fix and to maintain. We see remote support teams. Think of them as taxi dispatchers for trucks that are helping the truck understand how to respond to the world.

So, lots of opportunity.

Mr. ALLRED. Sure.

And that's OK. I will yield back. Thank you, Mr. Chairman.

Mr. VAN ORDEN. You are welcome, sir.

The Chair now recognizes my friend from the great State of Georgia, Mr. Mike Collins.

Mr. COLLINS. Thank you, Mr. Chairman.

And it is good to see you, Mr. Spear. It is good to see all of you. I appreciate you.

Actually, I have been kind of listening in and out. We kind of bounce around like basketballs around here from hearing to hearing.

But I just wanted to focus on one main thing real quick.

I started driving a truck when I was around 14, 15 years old and learned on a two-stick transmission. There were actually two sticks in there.

Since that time, we have had ABS braking, disc brakes, collision mitigation. We have had rollover stability. We have had lane departure. We have had adaptive cruise. The list goes on. We have even got automatic transmissions now. We have gone from two sticks down to a button that you push for R, N, or D.

The technology is always going to change. It is always changing. And you shouldn't be afraid of change. You shouldn't be afraid of any new technology. In most of the cases, it makes you more productive, and we need more productivity in the trucking industry. We have talked about weight issues here and how we can make it more productive.

So, Mr. Spear, I guess my main question is, from a Federal Government standpoint—and I have already heard you answer the question once today—what can we do or what can the Federal Government do to address the autonomous trucking vehicle as it comes out?

Mr. SPEAR. Well, don't panic. Don't panic. This is a wonderful venue to really understand where it sits and where it is headed, not only in terms of safety, quality of life for our workforce, what the gaps are, and where innovation can fill them, but also our ability as a country to compete globally. We don't want to concede this to China or anybody else around the world.

But let's not be afraid of innovation. It is a good thing. As you just said, it is empowerment of our drivers to be able to operate that equipment with better awareness, better responsiveness. These are all good additives that are going to continue. As we integrate this equipment in, they are going to make those skills more marketable, more portable. These are all good things.

I am not concerned about displacement. You have heard that answer. I didn't get a chance to answer, but the written testimony points to a 2021 DOT study that says that earnings are going to increase across for all long-haul truckers, increase overall employment, increase the U.S. GDP. And they did not find that there would be industry layoffs. That is a 2021 DOT study.

We put that in our written testimony because we are trying to get our arms around how we take innovation and channel it in the most productive, controlled sense.

And I think the collaboration with you in developing that safety performance standard, that framework federally so we don't have a patchwork of laws, that would go a long way to helping us advance the technology properly.

Mr. COLLINS. And I think I heard you say earlier that—something from the Federal Government standpoint that you all could work with together to come up with a framework of guardrails as this technology is developed. And I want to really emphasize that.

This industry is not an industry where we sit inside four walls. We don't make our living there. We make our living out on the road with other families, your family, my family. We want to be safe. I don't know of a trucking company out there that doesn't want to be safe. And when they are not safe, they are taken off the road.

But what we have in this industry, in the transportation industry, is we have a Department of Transportation on the Federal level that is being run by someone that is pushing a woke, socialistic, left-wing agenda, and he has no idea what he is doing. That is going to get somebody hurt more than autonomous vehicles.

We will never get rid of drivers. There is always going to be a place for a driver at some point. But there may be lanes that you can put autonomous vehicles in. But until we get somebody in the Department of Transportation who understands that and quits pushing an agenda on an experiment, then you are not going to get very far, and what you do get is going to be dangerous.

We have already seen it in the railroad industry. We have already seen that in the airline industry when NOTAM shut the industry down.

So, that is my solution. ATA has been very instrumental in even working with the Federal Government, sometimes where I didn't agree, but they have always been giving and encouraging and wanting to work with to make sure that this is the best dadgum industry in the world to work in, and it is.

With that, Mr. Chairman, I yield back. Thank you.

Mr. VAN ORDEN. Thank you, Mr. Collins. I appreciate that tremendously.

The Chair now recognizes himself for 5 minutes.

This is a very contentious issue, and I understand that. Two of my uncles were over-the-road truckers. One of them didn't notice the 11-foot sign on a bridge, so, he was no longer an over-the-road trucker. So, maybe our family wasn't the best over-the-road truckers, but dang it, we were there.

And I appreciate this industry. These are good jobs. They provide for families across the country. And we need to make sure that we are growing our pool of drivers.

So, both folks are saying some things here. I just kind of want to level the bubble to give us some perspective.

So, December is the 120th anniversary of the Wright Flyer taking off, 120 years ago. So, if you took the Wright Flyer and stuck it on a runway next to an F-35, you would see a difference. So, we do have to continue growing these technologies.

But can everybody here on that board just say yes or no? Can you agree right now and state publicly that our AV technology for these trucks, particularly the over-the-road trucks, that the technologies are not there yet? Like, we cannot completely rely on these now to move our goods around the country? Can you agree to that? This is a yes or no.

Mr. URMSON. Today we are not ready to rely on it completely, no.

Mr. VAN ORDEN. Good.

Mr. Farrah?

Mr. FARRAH. Congressman, industrywide, the technology is here. It is already making the road safer. We are seeing increased applications in things like—

Mr. VAN ORDEN [interrupting]. Is that a yes? I am serious, man. Is that a yes?

Mr. FARRAH. Technology is here and it is being applied in different ways across the country.

Mr. VAN ORDEN. OK, so, I am going to give you a maybe.

Mr. Spear?

Mr. SPEAR. Not yet, but it will be.

Mr. VAN ORDEN. Very well.

Ma'am? Ms. Chase?

Ms. CHASE. Yes.

Mr. VAN ORDEN. OK.

All right, check me out. Mr. Spear, I am going to hit you again on this because I want to echo Mr. Van Drew's concerns.

Trucks transport 72.5 percent of our domestic goods. In the future, looking down the road, what percentage of these trucks do you think will be autonomous?

Mr. SPEAR. That is a really good question.

Mr. VAN ORDEN. Yes.

Mr. SPEAR. I don't think we have good data yet for it in terms of what—it would really depend on our ability to have a Federal framework. You are going to see regional operations. You are going to see lanes being run between Texas and California where it is optimal. But in terms of expanding it to all 50 States, it is going to take time.

So, it is a tough one to gauge right now. I would love to have a Federal framework so that we could grow this nationally and deal with those problems.

Mr. VAN ORDEN. I would say, Mr. Spear, with that in mind, I would caution you to say that you would look anybody in the eye and say they are not going to lose their job, because you cannot answer what percentage of these vehicles are going to be autonomous. You just can't. You just said it.

So, let's kind of—that is your reputation you are talking about, not mine.

So, let me ask you this other question. How long can the United States of America, how long can we sustain ourselves if a significant portion of our trucking stopped in a millisecond?

Mr. SPEAR. Not more than a week.

Mr. VAN ORDEN. Not more than a week. OK, so, these are things we cannot trifle with, Mr. Spear. JBS got hacked. That is one-quarter of our ability to cut meat in the United States. Do you remember that? People were wondering where their pork chop was. It was rotting, the carcass, in a field in Iowa because that was a cyber issue.

And, Ms. Chase, I completely appreciate what you are saying.

And, Mr. Spear, you are getting briefed by guys on the cyber stuff. You know what? The DoD gets hacked all the time. The CIA got hacked. The FBI gets hacked. So, I don't trust that. I do not.

And the difference between some servicemembers' names, which I was one of them, and personal information after the DoD got hacked by China, the difference between me having to get LifeLock, or whatever the heck that is, and our entire Nation shutting down in a week are significant.

So, until we are able to secure these systems and these vehicles, I don't have confidence enough to get these on the road across the board.

And I just—I want everyone to remember Wright Flyer, F-35. So, I understand where we are at. We are in a continuum. So, please keep that in mind.

On the hazmat issue, you know what? You are going to have 16,000 pounds worth of lithium batteries on these? Is that right? You are going to have 16,000 pounds—

Mr. SPEAR [interrupting]. Up to, yes.

Mr. VAN ORDEN. OK, lithium is a hazardous material. So, you are talking 16,000 pounds of hazardous material in every one of these electric tractors. So, we are already talking about driving hazardous materials not in the cargo but under the tractor. OK? So, let's not forget that either. And lithium is a Class Delta fire when it catches on fire. It will burn through other metals. So, that, we have got to work on that stuff.

And here is the other thing—you know what? My time has expired, and I am going to hold myself to the same standard as everybody else.

So, has everybody else on the committee been recognized?

Oh, sorry, Mr. Molinaro.

The Chair now yields back. And I recognize my stealthy friend from the State of New York, Mr. Molinaro, for 5 minutes.

Mr. MOLINARO. Thank you, Mr. Chairman. That is not a description that has ever been used for me, but I appreciate it.

I want to thank you all for being here, and actually, I want to continue a little bit from my colleague's comments.

Of course this week we do acknowledge truckdrivers, and I appreciate all of you in one capacity or another. I express both the need to acknowledge the work of America's truckdrivers but, as each of you has alluded to, either directly or indirectly, the need to continue to support truckdrivers in this country.

Having served at the local level during the pandemic and economic shutdown, two very different things but they occurred at the same time, I can tell you that I saw firsthand the value and the great work of America's truckdrivers but also the weakness in our supply chain.

I will tell you that obviously automated commercial vehicles are exciting. It is a technology that we already know is underway and being used, as my colleague referenced.

What I want to, however, put an exclamation mark next to is that it is critically imperative that as the technology grows and innovation continues, that we do that in partnership with truckdrivers, law enforcement, and emergency responders. It is imperative that we work together with truckdrivers, law enforcement, and emergency responders.

And to that end I would offer, as and if the Federal Government starts to create greater guidance, there is a seismic change in emergency response and the need to ensure that emergency responders are able to respond to incidents that this kind of technology certainly brings to the fore.

Mr. Farrah, I know that my colleague was asking for a yes-or-no answer, and it was interesting to me because earlier in your testimony you basically said yes—or you basically said no, the technology isn't quite there yet and that we needed to rely in partnership with truckdrivers.

And at some point you said autonomous trucking needs truckdrivers. I understand what that means, transition, et cetera. But

I feel like you said that. And while the technology is exciting, we certainly do have a concern for loss of jobs.

And so, I wonder what projection has been done to identify both the pace of expansion in the technology and how that results in and what that would result in job loss.

Mr. FARRAH. Thank you, Congressman. I appreciate the opportunity to clarify.

What I was trying to get at earlier is that when you look at autonomous driving systems generally, whether a passenger car, shuttles, zero-occupancy delivery vehicles, and trucks, we are seeing these applications play out. We have situations where there are passenger cars going in in various cities. There are shuttles that are operating in places like senior centers and university campuses and whatnot.

So, those are all happening today, and we see that technology is already improving safety, is improving mobility and accessibility for the residents in that area.

With respect to autonomous trucking, I think, as we are seeing today, this technology continues to play out. You see some very exciting partnerships and pilots that are being announced. But there are companies that are needing to do additional development to get to that space.

So, it is a little more—

Mr. MOLINARO [interrupting]. That I understand. So, I serve on the Aviation Subcommittee, and we talk a lot about advanced air mobility, and that technology is going to fill a void.

This technology is going to create the loss of something, and that is trucks being driven by human beings.

What is the timeline, in other words, what do we think the build-out is, and what will that do to the loss of jobs? Not the broad.

Mr. FARRAH. Absolutely. We see this technology as augmenting truckdrivers. We need them in partnership. The reality is that the volume of freight—

Mr. MOLINARO [interrupting]. But you will need less of them.

Mr. FARRAH. Not necessarily. This is going to fill different parts of the market. As we know, we have a massive truckdriver shortage. We have more volume of freight that is going to be coming down the lane.

And so, we need to figure out a way to move this to support manufacturers, farmers, ranchers. Those are things that are absolutely essential. We want to be a part of that solution and work in partnership with truckdrivers to do that.

Mr. MOLINARO. So, can you—and, of course, I assume everyone on the panel, perhaps—you will commit to working with Congress in partnership with truckdrivers and emergency response and law enforcement as we develop those guidelines? Is that a commitment that the organization is making?

Mr. FARRAH. Absolutely. We are already doing that. We look forward to doing that in the future.

Mr. MOLINARO. Mr. Spear wanted to say yes, too.

Mr. SPEAR. Absolutely. That is my job.

Mr. MOLINARO. I only have a few seconds, but I wanted to ask you, Mr. Spear, just speak to the exciting consequence of this technology and how folks all across the country might benefit.



Mr. SPEAR. I think innovation should be embraced.

I just want to be clear on what I was saying earlier, is that I don't view—I didn't say people were going to be guaranteed their job. I said I don't view it as being threatened by innovation.

There is a gap. There is a gap of meeting demand and our ability to add talent. And as long as that gap exists—and it is going to grow—there is room for automation and technology to play.

So, not threatened by it. We should embrace it. And we look forward to working with this committee to really work on this issue and put some definition around it long term.

Mr. MOLINARO. Mr. Chairman, if I just might say, I certainly support the technology. It is critically important that we do that in partnership with the people who are sitting at home thinking that innovation is going to take their job, and that can't happen without them at the table.

Mr. VAN ORDEN. The gentleman yields back.

Are there any further questions from members of the subcommittee who have not been recognized?

Seeing none, that concludes our hearing for today.

And I would like to thank each one of the witnesses for coming. I know it is tough. I get it.

I ask unanimous consent that the record of today's hearing remain open until such time as our witnesses have provided the answers to any questions that may be submitted to them in writing. I know you are going to get a few.

Without objection, so ordered.

I also ask unanimous consent that the record remain open for 15 days for any additional comments and information submitted by Members or witnesses to be included in the record of today's hearing.

Without objection, so ordered.

The subcommittee stands adjourned.

[Whereupon, at 12:51 p.m., the subcommittee was adjourned.]



## SUBMISSIONS FOR THE RECORD

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### **Statement of the Commercial Vehicle Safety Alliance, Submitted for the Record by Hon. Eric A. “Rick” Crawford**

The Commercial Vehicle Safety Alliance (CVSA) respectfully submits the following comments for the record in response to the Committee on Transportation and Infrastructure’s Subcommittee on Highways and Transit’s hearing on “The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership.”

CVSA is a nonprofit organization comprised of local, state, provincial, territorial and federal commercial motor vehicle safety officials and industry representatives. The Alliance aims to prevent commercial motor vehicle crashes, injuries and fatalities and believes that collaboration between government and industry improves road safety and saves lives. Our mission is to improve commercial motor vehicle safety and enforcement by providing guidance, education and advocacy for enforcement and industry across North America.

CVSA commends the subcommittee for holding a hearing to consider the impacts of allowing automated commercial motor vehicles to operate on our roadways. The hearing offered a timely opportunity for Members to engage with industry stakeholders to better understand the state of automated driving system (ADS) technology and the potential impacts to roadway safety and supply chain efficiency.

CVSA and its members are committed to reducing crashes, injuries and fatalities on our nation’s roadways, and have long supported policies that encourage the deployment of safety technologies proven to improve commercial motor vehicle safety by preventing and/or mitigating the severity of crashes. Driver behavior is the leading cause of motor vehicle crashes, and technology can play a large role in eliminating or reducing the risk of human error and driver distraction, and the crashes and loss of life associated with them. In fact, basic versions of vehicle autonomy are already operating on our roads, preventing crashes. Examples of such technologies include enhanced anti-lock braking system (ABS) monitoring systems, vehicle stability systems, lane departure warning systems and collision warning systems. These systems all improve vehicle safety by helping keep vehicles in their lanes and operating at a safe distance from one another. ADS-equipped commercial motor vehicles have the potential to significantly improve roadway safety.

Discussion in the September 13 hearing covered a wide range of topics, including the potential safety benefits of deploying ADS-equipped commercial motor vehicles on our roadways, impacts on and improvements to the supply chain, possible labor impacts, the reliability of the ADS technology and cyber security concerns. However, one topic that was not discussed during the hearing that requires attention is how the Federal Motor Carrier Safety Administration (FMCSA) and its state partners will ensure that ADS-equipped commercial motor vehicles comply with the Federal Motor Carrier Safety Regulations (FMCSR) that regulate the mechanical components of the commercial motor vehicle and the motor carrier’s safety compliance.

Approximately 4 million commercial motor vehicle inspections are conducted every year throughout North America to ensure the large trucks and buses driving on our roadways are operating safely. Specially trained inspectors in each state, jurisdiction, territory and province inspect commercial motor vehicles based on inspection procedures and criteria created by CVSA, known as the North American Standard Inspection Program. The North American Standard Inspection Program exists, in part, to ensure that the commercial motor vehicles operating in interstate commerce are mechanically fit and pose no risk to others when operating on the roadways.

Oversight by the enforcement community is necessary to ensure ADS-equipped commercial motor vehicles are properly maintained, however there are challenges with applying the traditional roadside inspection program to ADS-equipped vehicles. Currently, the driver of a commercial motor vehicle plays a crucial role in the North American Standard Inspection process, performing tasks like activating required

lights, applying the brakes, disconnecting/reconnecting glad hands, listening for instructions from the inspector while under the vehicle to inspect the braking system and opening locked/sealed trailers for inspection of proper securement of cargo. If a vehicle is operating without a licensed commercial driver, how will these important aspects of the roadside inspection process be carried out? It is critical that a process be established to ensure these vehicles and technology are well maintained and fully functional.

To address this challenge, CVSA gathered representatives from the enforcement community, motor carriers and the ADS developers to prepare for deployment of ADS-equipped commercial motor vehicles. In 2018, CVSA formed an Automated CMV Working Group, tasked with assessing the latest advances in commercial motor vehicle automation and developing recommended approaches to incorporating those vehicles into the North American Standard Inspection Program, in order to ensure that the enforcement community is prepared to inspect and verify the regulatory compliance of this next generation commercial motor vehicle technology. After nearly two years of research and discussions, the group concluded that ADS-equipped commercial motor vehicles are not compatible with the current roadside North American Standard Inspection Program. Without a driver/operator on duty, several critical portions of the North American Standard Inspection cannot be performed. Further, inspection stations and other potential inspection locations will likely not be part of the ADS-equipped commercial motor vehicle's operational design domain, as those locations are unpredictable and difficult to program.

Because the current roadside inspection program is not compatible with ADS-equipped commercial motor vehicles, the working group recommended developing an alternative inspection and enforcement program for ensuring that these commercial motor vehicles and the trailers they are towing are maintained and operated in compliance with the FMCSR. In collaboration with inspectors, motor carriers, ADS developers and FMCSA, CVSA developed the Enhanced Commercial Motor Vehicle (CMV) Inspection Program, an inspection standard and procedure designed to govern the inspection of ADS-equipped commercial motor vehicles operating without a driver/operator on duty. The program establishes a no-defect, dispatch (point-of-origin) inspection program and includes an enhanced inspection standard and procedure for motor carriers operating ADS-equipped vehicles, as well as a 40-hour CVSA training course and exam (written and practical) for motor carrier personnel who will be conducting the inspections.

Under this program, rather than the driver conducting a pre-trip inspection (as is currently done), for ADS-equipped commercial motor vehicles, CVSA-trained and -certified motor carrier personnel will conduct the Enhanced CMV Inspection Procedure at the point of origin before dispatch, as well as in-transit inspections at a dictated interval throughout the trip. Any truck or trailer or commercial motor vehicle combination that fails the Enhanced CMV Inspection at the point of dispatch must be repaired prior to being dispatched—the vehicle must be defect free before being dispatched. Once on the road, the ADS-equipped commercial motor vehicle operating without a driver/operator on duty would be required to communicate to law enforcement while in-motion that it passed the Enhanced CMV Inspection prior to dispatch, its ADS are functioning, and it is operating within its operational design domain. ADS-equipped commercial motor vehicles operating without a driver/operator on duty that meet those parameters would be eligible to bypass inspection sites. Roadside inspections of qualifying ADS-equipped commercial motor vehicles in transit by law enforcement officials would be limited to situations where an imminent hazard is observed or during a post-crash investigation. In addition, all ADS-equipped commercial motor vehicles must be able to respond to law enforcement should an officer attempt to pull over a vehicle.

As noted above, because the current roadside inspection model simply is not compatible with ADS-equipped commercial motor vehicles operating without a driver/operator on duty, this proposed alternative approach is necessary to ensure the mechanical fitness and regulatory compliance of ADS-equipped commercial motor vehicles and the trailers they are towing. To that end, in the fall of 2022, CVSA filed comments in response to FMCSA's supplemental advance notice of proposed rule-making encouraging the agency to require motor carriers operating ADS-equipped commercial motor vehicles in interstate commerce without a driver/operator on duty to comply with the CVSA Enhanced CMV Inspection Program. CVSA's Enhanced CMV Inspection Program ensures that motor carriers operating ADS-equipped commercial motor vehicles without a driver/operator on duty are held to rigorous safety standards, while avoiding the many challenges presented by inspecting these vehicles under the current roadside North American Standard Inspection Program.

As Congress considers legislation regarding the use of ADS-equipped commercial motor vehicles, it is important that any policies look beyond the ADS technology

itself and address how overall safety and compliance with the FMCSR will be established and maintained. ADS-equipped commercial motor vehicles have the potential to dramatically improve safety on our nation's roads. But that safety benefit is contingent on ensuring that all vehicle components, and not just the ADS, are operational and being maintained. The Enhanced CMV Inspection Program, developed collaboratively with the ADS developers and the motor carrier industry will provide that assurance.

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**Letter of September 12, 2023, to Hon. Eric A. “Rick” Crawford, Chairman, and Hon. Eleanor Holmes Norton, Ranking Member, Subcommittee on Highways and Transit, and Hon. Sam Graves, Chairman, and Hon. Rick Larsen, Ranking Member, Committee on Transportation and Infrastructure, from Gary Shapiro, President and Chief Executive Officer, and India Herdman, Manager of Policy Affairs, Consumer Technology Association, Submitted for the Record by Hon. Eric A. “Rick” Crawford**

SEPTEMBER 12, 2023.

The Honorable ERIC A. “RICK” CRAWFORD,  
*Chairman, Subcommittee on Highways and Transit,  
House Committee on Transportation and Infrastructure, Rayburn House Office  
Building, Washington, DC 20515.*

The Honorable SAM GRAVES,  
*Chairman, House Committee on Transportation and Infrastructure,  
Longworth House Office Building, Washington, DC 20515.*

The Honorable ELEANOR HOLMES NORTON,  
*Ranking Member, Subcommittee on Highways and Transit,  
House Committee on Transportation and Infrastructure, Rayburn House Office  
Building, Washington, DC 20515.*

The Honorable RICK LARSEN,  
*Ranking Member, House Committee on Transportation and Infrastructure,  
Rayburn House Office Building, Washington, DC 20515.*

DEAR CHAIRMAN CRAWFORD, RANKING MEMBER HOLMES NORTON, CHAIRMAN GRAVES, AND RANKING MEMBER LARSEN,

Ahead of the September 13, 2023 Highways and Transit Subcommittee hearing, “The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership,” we highlight here how autonomous trucking technology is improving American lives and advancing American competitiveness.

The Consumer Technology Association (CTA) represents the \$505 billion U.S. consumer technology industry, which supports more than 18 million U.S. jobs. CTA's membership is over 1200 American companies—80% of which are small businesses and startups. CTA also owns and produces CES®, the world's most powerful technology event. CTA represents over 100 companies in the transportation ecosystem, including those developing autonomous vehicle (AV) technologies.

Autonomous commercial motor vehicles (CMVs) have the potential to substantially improve overall road safety for drivers and roadway users. Autonomous CMVs cannot become distracted, fatigued or impaired, have a 360-degree view around the vehicle, and use technologies to identify roadway risks easily missed by human drivers. Nearly 43,000 people died on U.S. roads in 2022—more than 115 per day—and most accidents are caused by human error.<sup>1</sup> Every family who has lost a loved one to a crash caused by speeding or impaired or distracted driving cares deeply about this issue. The status quo is unacceptable and can no longer be tolerated.

Autonomous CMVs can also make the transport of goods more efficient and affordable. Consumers recognize this benefit. CTA consumer research shows that 75% of U.S. adults view autonomous CMVs for the transport of goods as favorable or very favorable.<sup>2</sup> Autonomous CMVs could help relieve labor shortages in the freight sector and create new jobs such as technicians, remote operators and data analysts. The pandemic exacerbated supply chain challenges and companies are struggling to recruit and retain experienced drivers. More, AVs will broaden access to the job market for seniors and people with disabilities. AV technology is expected to contribute \$7 trillion to the global economy annually by 2050—a substantial portion of

<sup>1</sup> NHTSA, Traffic Death Estimate

<sup>2</sup> CONSUMER TECHNOLOGY ASSOCIATION, SELF-DRIVING VEHICLES: CONSUMER SENTIMENT 2021

which will be generated in the United States.<sup>3</sup> A policy framework that supports commercialization is critical to realizing the industry's economic potential.

To lead in the AV industry, government must remain engaged to help American companies compete globally. The U.S. is now in the lead, but adversaries and allies alike know where the U.S. is struggling to keep pace and are gunning to seize U.S. market share. China has emerged as a formidable player in the sector, with huge state support and funding driving technology advances and adoption.<sup>4</sup> The Chinese government seeks to expand its influence and overtake the United States as the world leader in this sector. To counter the huge financial support and avoid reliance on foreign-made systems, the U.S. must be smarter. We must set national goals and ensure the development and deployment of autonomous CMVs aligned with our broader national interests of creating jobs, boosting economic growth, and strengthening America's position in the global market.

Realizing the rewards of autonomous CMVs will require thoughtful, forward-thinking and targeted policies. However, even as the technology advances, American national testing and deployment are thwarted by a maze of conflicting state rules, legacy testing restrictions and federal limitations. The expanding patchwork of local rules across the country will only delay autonomous CMV deployment and hinder America's global technological leadership. American companies need a clear and predictable regulatory framework to bring AV benefits to the public at scale.

CTA offers its resources and expertise in this effort and looks forward to working with the Subcommittee to develop a pro-innovation framework for autonomous commercial motor vehicle deployment.

Sincerely,

GARY SHAPIRO,  
*President and CEO, Consumer Technology Association.*  
INDIA HERDMAN,  
*Manager, Policy Affairs, Consumer Technology Association.*

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**Letter of September 11, 2023, to Hon. Eric A. “Rick” Crawford, Chairman, and Hon. Eleanor Holmes Norton, Ranking Member, Subcommittee on Highways and Transit, from Gautam Narang, Chief Executive Officer and Co-founder, Gatik, Submitted for the Record by Hon. Eric A. “Rick” Crawford**

SEPTEMBER 11, 2023.

The Honorable ERIC A. “RICK” CRAWFORD,  
*Chairman, Subcommittee on Highways and Transit,  
House Committee on Transportation and Infrastructure, Rayburn House Office  
Building, Washington, DC 20515.*

The Honorable ELEANOR HOLMES NORTON,  
*Ranking Member, Subcommittee on Highways and Transit,  
House Committee on Transportation and Infrastructure, Rayburn House Office  
Building, Washington, DC 20515.*

DEAR CHAIRMAN CRAWFORD AND RANKING MEMBER HOLMES NORTON,  
In advance of the Subcommittee on Highways and Transit hearing “*The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership*” on September 13, 2023, I am writing to highlight the economic, societal and safety benefits of Gatik’s autonomous trucking solution, and emphasize the importance of maintaining and continuing to advance American leadership in the autonomous trucking sector.

Gatik is the market leader in autonomous middle mile transportation. Our company focuses exclusively on short-haul, B2B logistics for customers including

<sup>3</sup>CONSUMER TECHNOLOGY ASSOCIATION, ECONOMIC IMPACT: SELF-DRIVING VEHICLES 2017

<sup>4</sup>Dentons, Global Guide to Autonomous Vehicles

Walmart<sup>1</sup>, Kroger<sup>2</sup>, Pitney Bowes<sup>3</sup> and Georgia-Pacific<sup>4</sup>. In a consumer-driven logistics landscape that’s now entirely dependent on the ability to increase speed, facilitate greater choice and consistently lower prices, the middle mile is a segment of the supply chain that is fundamental to ensuring Americans have access to essential goods where, and when, they need them.

As Gatik’s CEO, I have overseen our relentless growth and success since founding the company in 2017. Following the launch of our first commercial deployment with America’s largest employer, Walmart, in 2019, we have signed long-term contracts with over 10 Fortune 500 customers, expanded our commercial operations to multiple markets including Arkansas and Texas, and today operate a fleet of approximately 60 trucks, completing hundreds of delivery runs every week. With demand for our solution from the nation’s largest grocers, retailers, e-commerce platforms, and consumer packaged goods companies constantly increasing, we plan to have over 300 vehicles operating by the end of 2024. Since commencing commercial operations we’ve proudly delivered well over half a million customer orders, contributing to a higher-functioning, more responsive US supply chain—and this is just the beginning. It’s an incredibly exciting time for Gatik, and the autonomous trucking sector, as we enable goods to be moved more safely, reliably and efficiently than ever before.

However, we are now at a critical juncture in our evolution as an industry. The US is leading the way, but other nations, including China, have emerged as powerful threats to US leadership and competitiveness. It’s therefore vital that the federal government strengthens its commitment to the growth of the autonomous vehicle (AV) sector to ensure we not only retain, but advance our leadership position, and make certain that the benefits of autonomous trucking can be felt in every community across the nation. The implementation of a national AV policy framework—one that provides the necessary regulatory certainty to enable the safe commercialization of AVs at scale—is vital to ensure that the vast economic, safety and societal benefits of AVs can be realized by Americans for generations to come.

The current status quo for safety on our roads and highways is tragic and unacceptable. According to The National Highway Traffic Safety Administration (NHTSA), nearly 43,000 traffic deaths occurred in 2022<sup>5</sup> which amounts to approximately 100 fatalities per day. In the same year, 5,887 people died in crashes involving large trucks, representing a 2% increase in fatalities from 2021<sup>6</sup>. These figures are staggering, especially when considered in the context of the promise of autonomous trucks to dramatically increase road safety. To highlight this opportunity, Gatik’s autonomous trucks have never been involved in an incident with our automated driving system (ADS) engaged. Our approach to safety, in the development and deployment of Gatik’s SAE Level 4 autonomous fleet, is built upon “structured autonomy”. By this we mean transporting goods exclusively on predictable, known, repeated routes. We purposefully avoid schools, hospitals, fire stations, heavily pedestrianized areas and other zones with historically elevated collision potential. This operating environment substantially reduces the extent of unknowns or “edge cases” and enables us to heavily optimize our technology for safety and efficiency per route. With every delivery, our technology offers the potential to increase safety on America’s roads for every road user, and contribute to a more responsible and reliable national logistics ecosystem.

In addition to increasing safety, Gatik’s autonomous solution is helping to ensure that the supply chain, upon which we all depend daily for the things we need, is more reliable, more responsive and more efficient than ever before. The COVID-19

<sup>1</sup> Frank Holland, *Walmart is using fully driverless trucks to ramp up its online grocery business*, CNBC (November 8, 2021, 5:00am EDT): <https://www.cnbc.com/2021/11/08/walmart-is-using-fully-driverless-trucks-to-ramp-up-its-online-grocery-business.html>

<sup>2</sup> Chris Morris, *Your groceries will get stocked by robots and delivered by self-driving trucks (if you shop with Kroger)*, Fortune (March 15, 2023, 10:51am EDT): <https://fortune.com/2023/03/15/your-groceries-will-get-stocked-by-robots-and-delivered-by-self-driving-trucks-if-you-shop-with-kroger/>

<sup>3</sup> Jack Stebbins, *Autonomous delivery company Gatik wins new pilot program with Pitney Bowes in Dallas*, CNBC (August 31, 2022, 7:00am EDT): <https://www.cnbc.com/2022/08/31/autonomous-delivery-company-gatik-wins-new-pilot-program-with-pitney-bowes-in-dallas.html>

<sup>4</sup> Kirsten Korosec, *Gatik’s self-driving trucks to haul Georgia-Pacific goods to Sam’s Club stores*, TechCrunch (June 7, 2022, 7:00am EDT): <https://techcrunch.com/2022/06/07/gatik-georgia-pacific-kbx-sams-club-partnership/>

<sup>5</sup> National Highway Traffic Safety Administration, DOT HS 813 428, Early Estimate of Motor Vehicle Traffic Fatalities in 2022, 1 (2023): <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813428>.

<sup>6</sup> National Highway Traffic Safety Administration, DOT HS 813 448, Early Estimate of Motor Vehicle Traffic Fatalities and Fatality Rate by Sub-Categories in 2022, 1 (2023): <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813448>.

pandemic brought the supply chain into crystal clear focus for the entire nation, as well as fundamentally and irreversibly changing the way our customers design their logistics networks. In order to facilitate the rapid movement of goods between distribution centers, microfulfillment centers, warehouses and customer-pick up points, America's retail and e-commerce giants have been forced to turn to a different kind of regional distribution architecture—one that requires more trucks, more trips and more drivers. However, due to a national driver shortage of close to 80,000 positions that's anticipated to double by the beginning of the next decade<sup>7</sup>, our customers are necessarily turning to autonomous trucking to help complement their existing fleets and ensure they're able to keep up with the relentless demand that human-driven fleets alone are unable to manage.

Gatik's solution is an innovative and safe way to add resources to our customers' operations without taking jobs away; our customers employ Gatik's solution to supplement existing operations where the gaps are most pronounced, and enable strategic realignment of transportation-related roles as we scale our operations together. Gatik is also creating innovative, high-paying jobs, and bringing new investment and revenue streams to states across the country including Texas and Arkansas, where most recently we have densified our commercial presence via a long-term partnership with Tyson Foods<sup>8</sup>.

To ensure America continues to strengthen its global leadership position in the AV sector, and make certain other nations do not take up the mantle, a federal policy framework that is focused on the safe and rapid deployment of AVs is needed. Gatik is very grateful to the Highways and Transit Subcommittee for its leadership on this critical issue, and looks forward to continuing to serve as a resource to your members and staff so that together we can continue to harness the advantages of AVs to the significant benefit of the nation's economy, supply chain and road safety.

Yours sincerely,

GAUTAM NARANG,  
CEO and co-founder, Gatik.

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**Letter of September 13, 2023, to Hon. Eric A. "Rick" Crawford, Chairman, and Hon. Eleanor Holmes Norton, Ranking Member, Subcommittee on Highways and Transit, from Kathryn Branson, Executive Director, Partnership for Transportation Innovation and Opportunity, Submitted for the Record by Hon. Eric A. "Rick" Crawford**

SEPTEMBER 13, 2023.

The Honorable RICK CRAWFORD,  
*Chair,*  
*Subcommittee on Highways and Transit, U.S. House of Representatives, Washington, DC 20515.*

The Honorable ELEANOR HOLMES NORTON,  
*Ranking Member,*  
*Subcommittee on Highways and Transit, U.S. House of Representatives, Washington, DC 20515.*

DEAR CHAIR CRAWFORD, RANKING MEMBER HOLMES NORTON, AND MEMBERS OF THE SUBCOMMITTEE:

On behalf of the Partnership for Transportation Innovation and Opportunity (PTIO), thank you for holding today's hearing, "The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership."

PTIO and its members<sup>1</sup> are focused on preparing workers for AV technology and understanding the interplay between AVs and the workforce. We are committed to pursuing policies that connect workers with AV-driven economic benefits and prepare them for new jobs and career pathways. At the same time, PTIO acknowledges

<sup>7</sup>*Driver Shortage Update 2022*, American Trucking Association (October 25, 2022): [https://ata.msgfocus.com/files/amf\\_highroad\\_solution/project\\_2358/ATA\\_Driver\\_Shortage\\_Report\\_2022\\_Executive\\_Summary.October22.pdf](https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_Driver_Shortage_Report_2022_Executive_Summary.October22.pdf).

<sup>8</sup>Worth Sparkman, *Tyson Foods readies for driverless roads*, Axios (September 6, 2023, 7:00am EDT) <https://www.axios.com/local/nw-arkansas/2023/09/06/tyson-foods-driverless-car-truck>

<sup>1</sup>PTIO Members include the American Trucking Associations, Daimler Truck, FedEx, Ford, Toyota Motor North America, UPS, Waymo, Amazon, and May Mobility



that AVs will bring occupational shifts and is likewise committed to facilitating a smooth transition for those whose job may evolve alongside the technology.

### I. AVS WILL DELIVER SOCIETAL BENEFITS AND ECONOMIC GAINS

PTIO supports pro-innovation policies that advance AV deployment in the United States given the technology’s potential to grow the economy and deliver a host of societal benefits.

*Economic growth and job creation:* Numerous studies project that widespread AV adoption will bring tremendous growth across the economy.<sup>2</sup> A 2021 Volpe National Transportation Systems Center economic analysis found that Level 4 and Level 5 automation in the long-haul trucking industry would raise annual earnings for all U.S. workers by between \$203 and \$267 per worker, per year. The study additionally found that trucking automation would increase total U.S. employment by 26,400 to 35,100 jobs per year on average over 30 years.<sup>3</sup>

*Safety:* As the U.S. Department of Transportation notes, human behavior is a contributing factor to the overwhelming majority of serious and fatal crashes.<sup>4</sup> Simply put, AV technology poses significant potential for radically improving traffic safety and addressing the public health and safety crisis playing out on our roads.<sup>5</sup>

*Strengthening the supply chain:* According to the American Trucking Associations, the trucking industry faces a shortage of more than 78,000 drivers and rising freight demand will require the addition of 1.2 million new drivers over the next decade.<sup>6</sup> Additional projections show that long-distance truckload miles are expected to grow by 68% in 2050, while employment over the same period will grow only by 30%.<sup>7</sup> AV adoption represents an opportunity to fill unmet demand and alleviate supply chain challenges.

*Access to mobility and job opportunities:* Communities without adequate transportation access can encounter barriers to securing jobs and/or face a limited pool of work opportunities. Transit agencies report that the existing transit workforce shortage is impacting their ability to provide service,<sup>8</sup> and recent research estimates that 197 million Americans in urban communities lack accessible and affordable transportation options. As that report notes, “shared autonomous vehicles (SAVs)—minivans, low-speed shuttles, and new purpose-built, light-duty vehicles equipped with Automated Driving Systems (ADS)—have the potential to be a more cost-effective alternative to conventional transportation options in underserved communities.”<sup>9</sup> Additionally, AV adoption could result in 4.4 million direct jobs for people

<sup>2</sup>A 2018 study found that widespread adoption of AVs could result in nearly \$800 billion in annual social and economic benefits attributable to the technology’s ability to improve roadway safety, increase access to mobility, and deliver environmental benefits. See Securing America’s Future Energy (SAFE), “America’s Workforce and the Self-Driving Future” (hereinafter “SAFE 2018”) (June 2018). Available at: [https://avworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE\\_AV\\_Policy\\_Brief.pdf](https://avworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE_AV_Policy_Brief.pdf)

<sup>3</sup>See U.S. Department of Transportation, Volpe National Transportation Systems Center and Centre of Policy Studies, “Macroeconomic Impacts of Automated Driving Systems in Long-Haul Trucking” (January 2021) (Hereinafter “2021 Volpe Study.” Available at: [https://ouravfuture.org/wp-content/uploads/2021/05/dot\\_54596\\_DS1-1.pdf](https://ouravfuture.org/wp-content/uploads/2021/05/dot_54596_DS1-1.pdf)

<sup>4</sup>See U.S. Department of Transportation, National Roadway Safety Strategy (January 2022). Available at: <https://www.transportation.gov/sites/dot.gov/files/2022-02/USDOT-National-Roadway-Safety-Strategy.pdf>

<sup>5</sup>There were over 40,000 roadway deaths and 2.5 million injuries in 2021 alone. See National Highway Traffic Safety Administration, Overview of Motor Vehicle Traffic Crashes in 2021 (April 2023). Available at: <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/813435#:text=1.37%20in%202021.-,The%20estimated%20number%20of%20people%20injured%20on%20our%20roadways%20increased,2020%20to%2080%20in%202021>.

<sup>6</sup>American Trucking Associations, “Driver Shortage Update 2022” (October 25, 2022). Available at: [https://ata.msgfocus.com/files/amf\\_highroad\\_solution/project\\_2358/ATA\\_Driver\\_Shortage\\_Report\\_2022\\_Executive\\_Summary.October22.pdf](https://ata.msgfocus.com/files/amf_highroad_solution/project_2358/ATA_Driver_Shortage_Report_2022_Executive_Summary.October22.pdf)

<sup>7</sup>Uber Freight, “The future of self-driving technology in trucking” (August 2022). Available at: <https://www.uberfreight.com/blog/the-future-of-autonomous-trucking-report/>

<sup>8</sup>A 2023 report from the American Public Transportation Association (APTA) found that “the transit workforce shortage is widespread and severe . . . ninety-six percent of agencies surveyed reported experiencing a workforce shortage, 84 percent of which said the shortage affects their ability to provide service.” See American Public Transportation Association, “Transit Workforce Shortage Synthesis Report” (March 2023). Available at: <https://www.apta.com/wp-content/uploads/APTA-Workforce-Shortage-Synthesis-Report-03.2023.pdf>

<sup>9</sup>See Securing America’s Future Energy, “Increasing Mobility and Access with Autonomous Vehicles” (April 2023). Available at: [https://safe2020.wpenginepowered.com/wp-content/uploads/2023/04/CATT\\_Brief\\_2\\_v04.pdf](https://safe2020.wpenginepowered.com/wp-content/uploads/2023/04/CATT_Brief_2_v04.pdf)

with disabilities through providing this community with additional means of personal mobility.<sup>10</sup>

## II. PRO-INNOVATION POLICIES THAT SUPPORT AV ADVANCEMENT ARE CRITICAL FOR GLOBAL COMPETITIVENESS AND WORKFORCE OPPORTUNITY

America's ability to maintain and cement global leadership on AVs is central in securing the aforementioned societal and economic benefits the technology will bring, as well as advancing workforce opportunity. A recent case study found that a policy framework favorable to deployment—coupled with effective partnerships between the public sector and industry, educational institutions, and communities—will boost development and inject economic activity in the traditional manufacturing and industrial economies across the country.<sup>11</sup> It is critical that we ensure the technology's resulting supply chains emerge in the United States.

Moreover, the U.S. is already home to a dynamic AV industry. This sector supports over 6,000 jobs in the Pittsburgh region alone,<sup>12</sup> and studies estimate continued growth across the country in the coming years.<sup>13</sup> PTIO therefore supports policies that are favorable to continued AV deployment in the U.S. to ensure growth of this industry and the domestic jobs it supports.

## III. BUILDING THE AV WORKFORCE PIPELINE ALONGSIDE CONTINUED DEPLOYMENT

AV adoption will not occur overnight, and the transition to an AV future will be gradual in nature. Likewise, research suggests that most AV-related labor impacts will not be seen until after 2040 even when using aggressive assumptions about adoption rates,<sup>14</sup> and that significant displacement in the trucking and public transit sectors is not likely. U.S. Department of Transportation analysis finds that AV deployment will not cause mass layoffs in the trucking industry as natural occupational turnover will offset any observed reductions in hiring.<sup>15</sup> With respect to transit, the Department projects that “any driver displacement would take place slowly and partly via routine attrition” given the high distribution of bus drivers who are in older age categories, as well as the time it will take for commercially available automation to diffuse across the nation's bus fleets.<sup>16</sup> Indeed, workforce demographics is another factor contributing to the labor shortages discussed earlier.<sup>17</sup>

That said, PTIO acknowledges that AVs will bring occupational shifts and changes to the way certain work is performed. As this will not occur overnight, the opportunity exists today to pursue the safe deployment of AVs concurrently with policies that build capacity in our workforce development systems and position Americans to succeed alongside the technology. Existing evidence shows that ongo-

<sup>10</sup> See National Disability Institute, “Economic Impacts of Removing Transportation Barriers to Employment for Individuals with Disabilities Through Autonomous Vehicle Adoption” (December 30, 2022). Available at: <https://www.nationaldisabilityinstitute.org/wp-content/uploads/2023/02/ndi-economicimpactsforemovingtransportationbarriers.pdf>

<sup>11</sup> See Center for Strategic & International Studies, Caporal, Jack; O'Neil, William; Arrieta-Kenna, Seán, “Bridging the Divide: Autonomous Vehicles and the Automobile Industry,” (April 2021). Available at: [https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210414\\_Caporal\\_Bridging\\_Divide\\_AVs.pdf?VersionId=FPD0WGpKizesSoGJZ9.gfUEAnKqUvV.W](https://csis-website-prod.s3.amazonaws.com/s3fs-public/publication/210414_Caporal_Bridging_Divide_AVs.pdf?VersionId=FPD0WGpKizesSoGJZ9.gfUEAnKqUvV.W)

<sup>12</sup> See TEconomy Partners, LLC for Regional Industrial Development Corporation and the Greater Pittsburgh Chamber of Commerce, “Forefront: Securing Pittsburgh's Break-out Position in Autonomous Mobile Systems” (August 2021). Available at: <https://ridc.org/wp-content/uploads/2021/10/PGH-Autonomy-Report-Executive-Summary.pdf>

<sup>13</sup> An economic analysis conducted by Steer projects that near-term deployment of AV delivery services, for example, will create 24 million direct jobs among technicians and supervisors, operational staff, and software engineers, as well as 10 million indirect and induced jobs due to economic gains between 2025–2035. See Steer, “Economic Impacts of Autonomous Delivery Services in the US” (September 2020). Available at: [https://ouravfuture.org/wp-content/uploads/2021/02/200910\\_Nuro\\_Final\\_Report\\_Public.pdf](https://ouravfuture.org/wp-content/uploads/2021/02/200910_Nuro_Final_Report_Public.pdf)

<sup>14</sup> See Securing America's Future Energy (SAFE), “America's Workforce and the Self-Driving Future” (June 2018). Available at: [https://avworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE\\_AV\\_Policy\\_Brief.pdf](https://avworkforce.secureenergy.org/wp-content/uploads/2018/06/SAFE_AV_Policy_Brief.pdf)

<sup>15</sup> 2021 Volpe Study

<sup>16</sup> See U.S. Department of Transportation, “Driving Automation Systems in Long-Haul Trucking and Bus Transit” (January 2021). Available at: <https://www.transportation.gov/sites/dot.gov/files/2021-01/Driving%20Automation%20Systems%20in%20Long%20Haul%20Trucking%20and%20Bus%20Transit%20Preliminary%20Analysis%20of%20Potential%20Workforce%20Impacts.pdf>

<sup>17</sup> According to the APTA report cited above, the transit shortage is largely attributable to an aging workforce: “Forty-three percent of transit workers are over 55, nearly double the percentage of the broader transportation sector. Agencies report that 24 percent of quitting workers are retirements; this is 34 percent at rural agencies.”

ing AV advancement and real-world deployments are in service of efforts to prepare the workforce for an AV future, as well as to build the programs and knowledge base that will facilitate transitions to new jobs in an AV economy.<sup>18</sup>

PTIO is pleased to share our Workforce Policy Agenda<sup>19</sup> with the Subcommittee, which represents our organization’s first set of policy recommendations based on what is known about AVs and where deployment exists today. The agenda includes proposals designed to connect workers with AV-induced economic gains and maximize benefits for Americans. These include: (1) labor market information reforms to further our understanding about the impact of AVs on the workforce; (2) policies that build capacity across our workforce system to support new AV career pathways while enabling providers to innovate and meet the needs of their local economies; and (3) proposals that invest in the worker and empower individuals to exercise choice in their career trajectory.

#### IV. CONCLUSION

Thank you for your leadership on this important issue and for holding today’s hearing. PTIO is committed to working with lawmakers to prepare Americans for the opportunities and changes that AV technology will catalyze. The chance to advance this objective exists alongside the opportunity to facilitate the safe deployment of AVs and unlock the technology’s benefits for communities across the country.

Sincerely,

KATHRYN BRANSON,

*Executive Director, Partnership for Transportation Innovation and Opportunity.*

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**Letter of September 12, 2023, to Hon. Eric A. “Rick” Crawford, Chairman, and Hon. Eleanor Holmes Norton, Ranking Member, Subcommittee on Highways and Transit, from John Samuelsen, International President, Transport Workers Union of America, AFL-CIO, Submitted for the Record by Hon. Eric A. “Rick” Crawford**

SEPTEMBER 12, 2023.

The Honorable RICK CRAWFORD,  
*Chair,*  
*Subcommittee on Highways and Transit, Committee on Transportation and Infrastructure, U.S. House of Representatives.*

The Honorable ELEANOR HOLMES NORTON,  
*Ranking Member,*  
*Subcommittee on Highways and Transit, Committee on Transportation and Infrastructure, U.S. House of Representatives.*

DEAR CHAIR CRAWFORD AND RANKING MEMBER NORTON,

On behalf of more than 155,000 members of the Transport Workers Union of America (TWU), I am writing to share our views as part of the record for your subcommittee’s hearing on *The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership*. We appreciate your subcommittee’s efforts to highlight the effects this technology could have on our workforce and our economy.

As the TWU testified before your subcommittee in February 2022, our members strongly support the integration of pro-worker, pro-safety technology into our transportation systems—including proven autonomous features like automatic emergency braking which assists operators to more safely conduct their work. The TWU has publicly joined with other unions and the broader transportation community to call

<sup>18</sup>AV companies like Nuro and Aurora have created partnerships with local community colleges that provide training pathways and certificates that prepare individuals for roles in the AV industry. See Nuro, “Nuro Launches Upskilling Initiative” (December 2, 2021). Available at: <https://medium.com/nuro/nuro-launches-upskilling-initiative-ec216f635164>. See Aurora, What do self-driving vehicles mean for jobs and the economy? (hereinafter “Aurora 2023”) (May 18, 2023). Available at: <https://blog.aurora.tech/progress/what-do-self-driving-vehicles-mean-for-jobs-and-the-economy>. Real world deployments serve as the basis for advancing our understanding around new jobs and transitioning roles, and support development of programs and strategies to connect workers with the skills they need to work alongside AV technology.

<sup>19</sup>PTIO, “PTIO Workforce Policy Agenda for the 117th U.S. Congress” (March 2022). Available at: [https://ouravfuture.org/wp-content/uploads/2022/03/finalPTIO\\_WorkforcePolicyAgenda\\_220330\\_lo.pdf](https://ouravfuture.org/wp-content/uploads/2022/03/finalPTIO_WorkforcePolicyAgenda_220330_lo.pdf)

on Congress to take the necessary steps to oversee and regulate autonomous vehicles at the federal level. We believe that comprehensive legislation to establish a federal framework for these vehicles—one that prioritizes safety and the high-quality jobs in our transportation systems—is past due.

It is not possible to create good public policy on autonomous vehicles (AVs) without directly addressing the issues this technology poses in the commercial sector—including trucking, hazardous materials movement, and public transportation. In July 2023, in a letter to the Energy & Commerce Committee, the TWU strongly argued for more involvement from the Transportation & Infrastructure Committee to ensure that any legislation on this topic include commercial motor vehicles and directly address workforce and public safety issues that are being created by increasingly automated vehicles. Absent a comprehensive framework to govern the development, testing, and deployment of AVs, we run the risk of undermining the existing level safety on our roads, as well as hundreds of thousands of high-quality jobs operating and maintaining the existing commercial motor vehicle fleet.

TWU members in San Francisco, CA are seeing first hand the disruption unregulated, untested AVs can create for public transportation and public safety workers. Across that city, our members have seen accidents, injuries, traffic jams, emergency services delayed, law enforcement confusion, blocking access to crime scenes, recalls, and the death of one pet as these companies treat our streets and our people as their personal testing range. Scaling up this lackadaisical model of oversight to include commercial vehicles would not only upscale these problems, but would also threaten good jobs for the workers currently operating public transportation and other commercial vehicles.

It is our hope that Congress can pass bipartisan AV legislation in near future that establishes meaningful safety and worker protections for the industry. This legislation should recognize that humans are an essential, non-optional piece of vehicle safety; require that operators have the ability to take control of vehicles when automation fails; prioritize pro-worker, pro-safety technologies that advance jobs and safety over untested ones which threaten to undermine these goals; demand robust safety performance data collection and review for all AV manufacturers and operators; and ensure that workers have a strong voice in implementing these new technologies, both in public policy and on-the-ground decision-making.

The TWU appreciates your work to advance serious AV legislation which puts workers first in this technological transition.

Sincerely,

JOHN SAMUELSEN,

*International President, Transport Workers Union of America, AFL-CIO.*

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**Statement of the International Brotherhood of Teamsters, Submitted for the Record by Hon. Eleanor Holmes Norton**

On behalf of our 1.2 million members, the International Brotherhood of Teamsters submits the following statement regarding the Subcommittee's hearing entitled "The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership".

The Teamsters Union is proud to represent hundreds of thousands of members in every corner of the nation who drive for a living, including trucks, transit vehicles, and other specialized commercial motor vehicles. The testing and deployment of autonomous or partially autonomous trucks presents critical questions and challenges for both our membership, as well as this Committee and federal regulators.

As the Committee hears testimony today on the state of autonomous trucking, the Teamsters Union calls on members to consider not just the status of automated trucking technology as advertised by manufacturers, but the totality of salient and essential issues related to its use and the Committee's role in the future of the technology.

To date, both Congress and regulators have yet to enact a meaningful federal framework to assess, regulate and oversee automated vehicles of any stripe. The implications of a lack of federal oversight have made itself readily apparent as AV testing and deployment of certain vehicles has expanded. In recent weeks, technology failure of Cruise's automated robotaxis in San Francisco has resulted in preventing first responders from quickly transporting a critically injured pedestrian, who later died, to a hospital. The San Francisco Fire Department reported that the interference "contributed to a poor patient outcome, delaying the definitive care re-

quired in severe trauma cases”.<sup>1</sup> Teamsters Local 350 members, representing sanitation workers in the city, have reported numerous incidents involving malfunctioning Cruise vehicles, including a recycling truck driver who was unable to move his vehicle after it was pinned in by immobilized robotaxis.

While no developing technology is perfect, the stakes are immeasurably higher for automated 80,000 pound trucks, wherein the severity of a crash poses risks of several orders higher magnitude than a light duty passenger car. Congress must appreciate these risks, and its role in mitigating them going forward. Importantly, the Teamsters do not oppose the responsible testing of new technologies, particularly technologies used in conjunction with human operators to improve safety, and we have long been on the forefront of the adoption of such development. However, it is critical that legislators and regulators do not continue to permit a “Wild West” testing and deployment environment in which states and local jurisdictions bear all responsibility for the safety of these operations.

In the House, Congressional jurisdiction as it relates to autonomous trucking is substantially bifurcated. Recently, the House Energy and Commerce Committee’s Subcommittee on Innovation, Data, and Commerce held a hearing on legislation under its purview. These bills largely deal with issue concerning manufacturing standards and regulations relating to vehicle equipment. While we remain engaged with those important efforts, the work of this Committee will be of no less importance, particularly as it relates to the trucking industry. Issues surrounding the Federal Motor Carrier Safety Administration’s issuance and revocation of operating authorities, vehicle inspections, safety ratings and operator licensing for autonomous trucking are all worthy of legislative consideration.

Further, this Committee’s jurisdiction also extends to considerations of workforce impacts, if and when automated trucking technologies change or otherwise impact existing professions in the industry. It is our strong belief that any Congressional activity on vehicle automation that does not also consider these issues will be inherently deficient.

To this end, for the first time in the history of the International Brotherhood of Teamsters, this week we have put forth our “Autonomous Vehicle Federal Policy Principles”. This attached document offers a pro-safety, pro-worker path forward as automated trucks are tested and deployed. We look forward to working with this Committee to implement these recommendations into future efforts as the need for a robust federal framework becomes increasingly apparent.

*Attachment*

International Brotherhood of Teamsters  
Autonomous Vehicle Federal Policy Principles

*For the first time in our history, the International Brotherhood of Teamsters is releasing an “Autonomous Vehicle Federal Policy Principles” framework, a guiding document for federal policymakers as they continue to address issues surrounding autonomous vehicles (AVs).*

*As a union that represents hundreds of thousands of workers who turn a key for a living, and the only union substantially representing commercial truck drivers, the Teamsters have a deep interest in the outcome of federal AV regulation and legislation. This includes consideration of safety and workforce impacts to our members, the millions of other Americans who operate a vehicle for their livelihoods, and the public, who are increasingly asked to share the road with AVs.*

*Federal laws and regulations that do not meaningfully address the operations and effects of AVs will result in catastrophic impacts on American workers and risk increasing preventable roadside fatalities. The Teamsters are committed to working with Congress and federal regulators on a path forward that prioritizes both workers and safety. On behalf of our members and the American people, we strongly urge the adoption of the proposals contained within the International Brotherhood of Teamsters’ “Autonomous Vehicle Federal Policy Principles.”*

REGULATING THE VEHICLE

The federal government has authority over vehicle manufacturing and performance standards and must apply these authorities to AVs. Legislation should mandate:

<sup>1</sup> <https://www.sfgate.com/bayarea/article/cruise-cars-reportedly-block-first-responders-18343475.php>

- Federal Motor Vehicle Safety Standards (FMVSS) address the design, construction, and performance of highly-automated vehicles and automated driving systems (instead of regulating by waiver).
- This must include object and event detection and response, how a vehicle responds when its tech fails, how a vehicle interacts with an operator, and what a vehicle does post-accident (including interaction with law enforcement).
- New FMVSS should differentiate between types of AVs—a one size fits all approach for automated light duty passenger vehicles, transit buses, and 26,000 lb. trucks is not appropriate.
- FMVSS for commercial motor vehicles must preserve the traditional operating equipment for a human driver.
- A new FMVSS must standardize components of Heads-Up-Display modules.
- Standards for AV testing, and prohibitions on AVs from being sold until safety requirements are satisfied.
  - Including public disclosure of approval for testing and sale.
- Requirements for the Operational Design Domain (ODD) of an automated vehicle, prohibiting an autonomous system from operating in an ODD for which it has not been approved.
- Installation of data recorders on all autonomous vehicles that records performance information that could be made available to DOT and/or National Transportation Safety Board, with attendant protections against using data to discipline a human operator.
- Required reporting on incidents involving AVs, as per National Highway Traffic Safety Administration Standing General Order 2021-01.
  - Reporting should also include any incidents of re-engagement by the human operator, and data must also be made publicly available.
- The requirement of manufacturers to inform consumers of the capabilities and limitations of highly-automated vehicles and partially-automated vehicles, including any changes to such capabilities and limitations that may result from software updates to such vehicles, as well as clear information on when over-the-air updates occur.
- Rulemaking on cybersecurity, including protections against unlicensed/unauthorized access to wireless technology.
- New standards applicable to AVs for the vehicle inspections required by the Federal Motor Carrier Safety Administration (FMCSA), including roadside and pre-trip inspections.
- Prohibition on the procurement of transit bus models that have not been approved by DOT via the Bus Testing Program.

#### REGULATING THE OPERATOR

FMCSA regulates the driver of commercial vehicles, and the circumstances and safety conditions in which they operate. In this regard, Congress should require that:

- A human operator must remain in all AVs, regardless of the Society of Automotive Engineers (SAE) automation level.
- A human operator of an AV must remain subject to DOT Commercial Driver's License (CDL) requirements, hours of service limitations, and all other protections that affix to non-autonomous CDL drivers.

#### REGULATING OPERATIONS

The DOT and FMCSA possess numerous regulatory authorities related to both the safe operations of vehicles and the ability of carriers to receive authority to begin and continue operations. Existing regulation does not differentiate between traditional and autonomous vehicles in this regard, and must therefore be amended to provide meaningful insight into the safety of new autonomous operations, including requiring that:

- Safety and Fitness Electronic Records listings include the amount of SAE Level Four and Five vehicles in use at any particular carrier; Compliance, Safety, Accountability Safety Ratings specifically and explicitly rate the safety performance of any AVs in a fleet.
- FMCSA have the ability to revoke operating authority for the use of AVs by any operator at its discretion due to safety issues.
- Incident data involving an AV be separately categorized within Motor Carrier Management Information System reporting.
- FMCSA's National Consumer Complaint database explicitly solicits complaints concerning AVs.

- Carriers wishing to deploy AVs report where they are in use, and in what function.
- Any application for operating authority using an AV be made available for public review.
- Fully automated driver-out operations are not permissible for the carriage of hazardous materials.

#### INTERACTION WITH OTHER LAWS

Congress must consider issues that may arise from the relationship between existing law and the efforts to legislate and regulate AVs.

- Any state or local laws, regulations or other requirements that conflict with or provide lesser protections than the provisions and requirements in these principles shall yield to these provisions and shall be superseded by the provisions herein. However, state or local regulations requiring greater protections such as (but not limited to) requiring a) additional human operators and monitors b) greater licensing standards; c) greater insurance requirements; d) greater restrictions on locations and times for the use of autonomous vehicles shall not be preempted provided they are not inconsistent with the purpose of maximizing public safety and protecting and preserving human control and supervision over autonomous vehicles.
- Liability for accidents involving AVs should be properly assigned to liable parties—such as the vehicle manufacturer or automated system manufacturer where appropriate.

#### WORKFORCE IMPACTS

Congress cannot entertain any legislative package dealing with AVs that does not directly and forcefully address issues related to the workforce, and any changing operational or economic conditions that occur as the result of AV commercialization. This should include:

- Creating a wage replacement program for workers who are displaced, modeled on Trade Adjustment Assistance.
- Creating grant programs for impacted workers, including training on new technologies for individuals whose job functions may change (such as mechanics) as well as reskilling for workers who are displaced.
- Requiring any recipient of federal funding or holder of FMCSA operating authority, or recipient of federal transit funding to publicly disclose the planned use of AVs and its expected workforce impacts, and that this information must separately be delivered to any impacted collective bargaining unit.
- The conditioning of DOT grants on responsibilities to employees impacted by automation include the creation of 13(c)-like protections that preserve collective bargaining rights, where such protections do not currently exist.
- That the DOT, Dept. of Labor, and other relevant agencies study the economic impacts of vehicle automation on issues beyond driver displacement, including impacts of lost tax revenue and impacts to supply chain-connected businesses like rest stops.



**Letter of September 13, 2023, to Hon. Eric A. “Rick” Crawford, Chairman, and Hon. Eleanor Holmes Norton, Ranking Member, Subcommittee on Highways and Transit, from Nathaniel F. Wienecke, Senior Vice President, American Property Casualty Insurance Association, Submitted for the Record by Hon. Rudy Yakym III**

SEPTEMBER 13, 2023.

The Honorable RICK CRAWFORD,  
*Chair,*  
*House Transportation and Infrastructure, Subcommittee on Highways and Transit,*  
*Washington, DC 20515.*

The Honorable ELEANOR HOLMES NORTON,  
*Ranking Member,*  
*House Transportation and Infrastructure, Subcommittee on Highways and Transit,*  
*Washington, DC 20515.*

Re: House Subcommittee on Highways and Transit Hearing: *The Future of Automated Commercial Motor Vehicles: Impacts on Society, the Supply Chain, and U.S. Economic Leadership*, September 13, 2023

DEAR CHAIRMAN CRAWFORD AND RANKING MEMBER NORTON,

Automated vehicles hold great promise to save lives by reducing the number of deaths and accidents on our nation’s roads. Nonetheless, vehicle accidents and damage to vehicles will continue to happen. On behalf of the American Property Casualty Insurance Association (APCIA) and our nearly 1200 member companies, I write to highlight that to protect people and property, vehicle liability insurance must remain an indispensable part of vehicle risk management. As it has been for over a century, insurance remains the most effective means to fairly and efficiently compensate crash victims.

As your committee discusses the “The Future of Automated Commercial Motor Vehicles” in today’s hearing, APCIA continues to urge policymakers to maintain a focus on roadway safety; support the continued primacy of state regulation of insurance and liability issues; and ensure that vehicle owners control and can grant access to vehicle-generated data.

*Data Access and Innovation*

- To support data access, vehicle owners must be able to control and grant access to vehicle-generated data on a real-time and secure basis.
- To support innovation in motor vehicle technology, insurers will need to have reasonable access to information to identify a vehicle equipped with advanced technology systems, including common terminology addressing the type of technology on board a vehicle.
- Insurers need access to this information to develop products and underwriting methods to meet the needs presented by the changing nature of the risk and to obtain regulatory approval to bring those products to market as well as efficiently handling claims.
- Accident data, as well as pictures and video from an automated driving system should be available to federal and state transportation regulators, law enforcement, the parties to an accident, insurers and authorized representatives of parties to an accident. The data should be available on reasonable terms to allow for prompt accident investigation and resolution of claims for damage and injury arising from the accident.

*Safety*

- The increased automation of driving functions will mean that, over time, some motor vehicle laws and regulations may need to be changed. Nonetheless, all vehicles must continue to meet all federal and state safety requirements and be capable of complying with all state motor vehicle laws.
- Any exceptions to existing auto safety laws and motor vehicle safety standards should be exceedingly rare and limited to only the highest levels of automated driving and should clearly define the levels of automation to which the modification applies. Exceptions should not be made for collision protection standards or, indeed, any human safety features.
- Automated and connected vehicle systems must be hardened against cyber-attack.

*Primacy of State Regulation on Insurance and Liability Issues*

- Insurance will continue to be regulated on a state-by-state basis. This regulatory framework should be maintained.



- Liability apportionment should remain with the states.
- State legal systems should be allowed to adapt to ensure accident victims are appropriately compensated. The U.S. legal system has proven to be very adaptable to new technology.

APCIA looks forward to continuing our work with you and your colleagues on this important issue.

Sincerely,

NATHANIEL F. WIENECKE,

*Senior Vice President, American Property Casualty Insurance Association.*



## APPENDIX

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### QUESTION FROM HON. RICK LARSEN TO CHRIS URMSON, COFOUNDER AND CHIEF EXECUTIVE OFFICER, AURORA INNOVATION, INC.

*Question 1.* Mr. Urmson, during your testimony you discussed the difference between an advanced driver assistance system (ADAS) technology and Automated Driving System (ADS). There remains a lot of confusion between these different technologies and the level of assistance they provide drivers. This confusion can hamper the advancement and adoption of autonomous vehicles, as well as lead to unsafe conditions for every road user.

How would greater transparency on the actual capabilities of ADAS and ADS technology educate the public, support innovation, and mitigate safety concerns?

*ANSWER.* Ranking Member Larsen, thank you for the question. Aurora agrees that conflation between levels of driving automation systems has caused public confusion that has the potential to hinder the deployment and adoption of autonomous vehicles (AVs) on U.S. roads. We believe greater understanding regarding the capabilities of distinct driving automation technologies can lessen this confusion and that industry and all levels of government can support this endeavor. At its most basic level, this can be achieved by Congress, or the appropriate Federal agency, explicitly prohibiting the use of the terms “self-driving vehicle/truck/car” and “autonomous vehicle/truck/car” from being used by those entities marketing SAE Level 1 or Level 2 systems.<sup>1</sup>

It is critical to distinguish the Aurora Driver, which is being developed as an SAE Level 4 automated driving system (ADS), from SAE Levels 1 and 2 driver support features and advanced driver assistance systems (ADAS).

SAE International developed the six Levels of Driving Automation to clarify the role of a human driver, if any, when the driving automation technology is engaged. This taxonomy has also been endorsed by the U.S. Department of Transportation (USDOT) in its repeated guidance to companies developing, testing, and operating ADS-equipped vehicles on public roads. We encourage Congress and the Administration to communicate clearly to the American public a basic distinction about the differences in these systems: the need for a human in any portion of the driving task. If a human driver seated in the vehicle must supervise the system or complete any portion of the driving task at any time while the driving automation system is engaged, then the system should be branded as a “driver assistance technology,” not “autonomous” or “self-driving”.

To illustrate, technologies classified as Levels 1 and 2 driving automation systems, including ADAS, are driver support features and are widely available in vehicles sold in the U.S. market today. These technologies, including automatic emergency braking and lane-keeping assistance systems, require constant supervision by the human driver in order to maintain safety at all times. Technologies classified as Level 3 ADS are conditional driving automation, meaning that while the human driver does not need to supervise the driving automation system while it is engaged, they are still expected to intervene and respond appropriately when the system requests so or a performance-relevant system failure occurs. On the other hand, AVs operate with a Level 4 or 5 ADS, meaning when the ADS is engaged, a human seated in the vehicle is a passenger and will not be required to take over the driving task in any situation.

The language and definitions USDOT uses in regulations, orders, and guidance will drive the public discourse and need to be clear for all stakeholders. Consistent definitions for driving automation technology are incredibly important to ensure neither regulations nor the public conflate vehicles using Levels 1, 2, and 3 technology

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<sup>1</sup>See SAE J3016, Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (April 2021).

with those using Levels 4 and 5. In addition, industry must support educating the public on these distinct technologies and the extent of their capabilities. For its part, Aurora will continue investing in an elevated public discourse on these topics. For example, Aurora is a founding member of PAVE, the Partnership for Automated Vehicle Education, a coalition of industry, nonprofits, and academics aimed at educating the public and policymakers on autonomous technologies, because we believe engagement and education regarding levels of driving automation is so important for all stakeholders. We are also members of the Autonomous Vehicle Industry Association, American Trucking Associations, Consumer Technology Association, TechNet, and other trade associations in order to engage on these matters across industries.

Thank you again for the opportunity. We look forward to continued work with the Subcommittee as it addresses these important issues and supports safety, innovation, and jobs across the United States.

**QUESTIONS FROM HON. RICK LARSEN TO CHRIS SPEAR, PRESIDENT AND CHIEF EXECUTIVE OFFICER, AMERICAN TRUCKING ASSOCIATIONS**

*Question 1.* As we consider the development of autonomous trucks and potential federal legislation, we must ensure that any framework does not interfere with the movement of goods across our borders.

Have your member organizations begun working with regulators or AV companies in Canada or Mexico? How should federal regulations deal with autonomous trucks that may be following different national standards?

*ANSWER.* ATA's membership includes AV trucking developers based in Canada, and ATA's members have been working with the Commercial Vehicle Safety Alliance (CVSA) on law enforcement inspection standards for automated trucks that could be applied consistently within the U.S., Canada, or Mexico. However, more work is needed to coordinate with Canadian and Mexican regulators to establish a framework for crossing jurisdictions. Several ATA members are engaging with the U.S. Border Patrol due to their automated truck operations near the U.S.-Mexico border, and this may help the AV industry learn if/how regulations impact what is feasible.

**QUESTIONS FROM HON. RICK LARSEN TO CATHERINE CHASE, PRESIDENT, ADVOCATES FOR HIGHWAY AND AUTO SAFETY**

*Question 1.* Currently, autonomous vehicle manufacturers are only required to disclose to the Department of Transportation when their "driver" is engaged and involved in a crash. NHTSA and FMCSA have launched several voluntary information sharing efforts. Greater transparency improves public confidence and helps identify problematic trends earlier.

*Question 1.a.* What information should autonomous vehicle manufacturers be required to disclose to the government and make available to the public?

*ANSWER.* Advocates for Highway and Auto Safety (Advocates) has been at the forefront of furthering proven and lifesaving technologies to prevent crashes and reduce the motor vehicle crash fatality and injury toll since our founding over three decades ago. Automated, or autonomous, vehicles (AVs) and automated commercial motor vehicles (ACMVs) may be able to contribute to this goal in the future. However, this outcome will not be achieved in the absence of effective regulations setting minimum performance standards, as well as thorough transparency, strong government oversight, and AV and ACMV industry accountability.

Advocates supports the National Highway Traffic Safety Administration (NHTSA) obtaining valuable data involving vehicles equipped with Level 2 advanced driver assistance systems (ADAS) and automated driving systems (ADS) through Standing General Order 2021-01 (SGO). The agency indicates that it believes the frequency of crashes equipped with these systems will increase. This unique information can help the agency identify common problems or systemic issues with certain vehicles and/or equipment. According to data collected by the SGO (as of October 13, 2023), there have been approximately 382 crashes involving ADS and 1,076 with ADAS. These include 28 crashes resulting in a fatality. While it is important that NHTSA continues to collect this data, Advocates supports enhancing the SGO as outlined by several Members of Congress in the two attached letters sent to the agency on February 28, 2023, and September 19, 2023.

Furthermore, the U.S. Department of Transportation (DOT) must establish a database for ACMVs that includes such information as the vehicle's identification number; manufacturer, make, and the level of automation of each automated driving system with which the vehicle is equipped; the operational design domain (ODD) of each automated driving system; and, the Federal Motor Vehicle Safety Standard (FMVSS), if any, from which the vehicle has been exempted.

The fact remains that there is scant independently verifiable data that ACMVs can operate safely on any road or help to address any of the Nation's longstanding supply chain issues. Furthermore, we already know from real world experience the limitations, mistakes, defects, failings, and faults of self-driving technologies currently in passenger vehicles. It would be irresponsible and an abrogation of safety to allow self-driving trucks, weighing 80,000 pounds and traveling at high speeds to operate on streets and highways with cars, motorcycles, and other road users without U.S. DOT first collecting the requisite data and meeting basic minimum performance requirements established with federal government standards.

#### *Attachments*

CONGRESS OF THE UNITED STATES,  
WASHINGTON, DC 20515,  
*February 28, 2023.*

ANN CARLSON,  
*Acting Administrator,*  
*National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE,*  
*Washington, DC 20590.*

DEAR ACTING ADMINISTRATOR CARLSON:

Congratulations on the announcement that President Biden intends to nominate you as the National Highway Traffic Safety Administration (NHTSA) Administrator. We share your commitment to keeping people safe on our nation's roads and highways. We appreciate the work of NHTSA to protect consumer safety as new vehicle technologies and innovations emerge. The Standing General Order (SGO) 2021-01 issued in June 2021 is a good first step, and we urge you to take further action at a time when far too many lives are lost on America's roads each year.

Data obtained through the SGO from July 2021 to January 2023 have revealed at least 18 crashes resulting in a fatality involving Automated Driving Systems (ADS) or Advanced Driver Assistance Systems (ADAS). It is essential that NHTSA continues to collect and evaluate data involving these technologies to keep the public safe. Furthermore, stakeholders, including the public, must have the opportunity to review this data without unnecessary opaqueness which can significantly hamper its usefulness. As such, we encourage NHTSA to take the following actions to strengthen the effectiveness of the SGO:

- The SGO expires in 2024 and a change in leadership at NHTSA could result in the SGO being rescinded. Therefore, the agency should eliminate the expiration date of the SGO.

#### *Data Integrity*

- Many of the crash reports provided to the public include numerous missing or "unknown" data points. This information is important to fully understand and evaluate an incident, because it includes, for example, roadway surface condition, lighting, crash partner description, and highest injury severity. Manufacturers must be required to review independent resources such as police accident reports to obtain this missing information and submit it to NHTSA. In addition, all available visual evidence involving these crashes including photographs and videos must be included in the reports. In gathering such additional data necessary for NHTSA to comply with its motor vehicle safety mandate, NHTSA must ensure that appropriate privacy safeguards are in place to protect personal information from misuse.
- NHTSA should require manufacturers to record (and make available to NHTSA in a standardized format) privacy-preserving, anonymized data that characterizes driver and vehicle performance before and during an ADS- or Level 2 ADAS-involved crash that must be reported pursuant to the SGO. Such data should enable automatic notification of these crashes to the manufacturer, which should be immediately reported to NHTSA.
- NHTSA should establish performance standards for, and require all new vehicles to include, driver monitoring systems that will minimize driver disengagement, prevent automation complacency, and account for foreseeable misuse of L2+ automation systems. Vehicles equipped with L2+ automation systems

should record data related to the performance of driver monitoring systems to enable research on and improvement of L2+ systems.<sup>1</sup> Such data recording should protect personal information from misuse.

- NHTSA should combine records for each crash enabling more ready access to and processing of the data. Currently, crashes in the database can have multiple records as more information is obtained about the incident. While it is important that NHTSA provide as much information as possible about each crash, these multiple records can lead to confusion.

#### *Transparency*

- The crash narratives provided to the public are heavily redacted and it appears that the redactions may not be limited to information that is confidential business information (CBI). Other variables in the dataset are also heavily redacted including whether the ADAS/ADS was operating within its operational design domain (ODD), the ADAS version, and crash location specific information. Information which is essential to evaluating the performance of Level 2 ADAS / ADS equipped vehicles should not be withheld from the public because industry alleges it is CBI. NHTSA needs to reevaluate its process for determining what information should be redacted from crash narratives and other publicly available information, including its process for determining whether information is CBI. The agency should establish objective criteria that increase transparency and should create clear timelines for CBI determinations. These determinations must be timely, and the public should be provided transparent updates on the status of the determinations as well as explanations of the results. The agency should appoint a lead expert, separate from the Chief Counsel, to be in charge of the process who is responsible for the careful review and analysis of all data elements including narratives.
- The SGO data as presented are not comparable to any other crash data sets available from the agency. This lack of context not only impedes the ability for the public to contextualize the information being provided but also can and already has led to misleading reporting. The agency must work with other agencies (such as the Federal Highway Administration) or organizations (such as the Transportation Research Board), and manufacturers to collect some form of exposure data (such as vehicle miles traveled or ODD) to complete the picture for the public.
- Additionally, with the proliferation of unregulated ADAS systems into the vehicle fleet and increasing testing of ADS, it will benefit safety research for the existing crash data collection systems utilized by NHTSA to better identify ADAS and ADS vehicles involved in crashes to enable the analysis of the performance and/or failures of such systems.

#### *Compliance*

- The SGO should include and identify all companies employing remote drivers during any point in the operation.
- NHTSA must regularly review and update the list of companies subject to the SGO. The agency must ensure compliance with the SGO by all subjected companies.
- If companies are not complying with the SGO, NHTSA must use its statutory authority to rectify this issue. Mandatory compliance by companies should also include any follow-up information requested by the agency.

<sup>1</sup>These suggestions are in line with recommendations from the National Transportation Safety Board (NTSB) in the report on the March 23, 2018 Mountain View, California crash.

Thank for your attention to this important matter. We respectfully request that you provide a response within 30 days detailing actions the agency will take to strengthen the SGO.

Sincerely,

JAN SCHAKOWSKY,  
*Ranking Member, House Subcommittee on Innovation, Data, and Commerce,  
House Committee on Energy and Commerce.*

KATHY CASTOR,  
*Member, House Subcommittee on Innovation, Data, and Commerce,  
House Committee on Energy and Commerce.*

LORI TRAHAN,  
*Member, House Subcommittee on Innovation, Data, and Commerce,  
House Committee on Energy and Commerce.*

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CONGRESS OF THE UNITED STATES,  
WASHINGTON, DC 20515,  
*September 19, 2023.*

The Honorable ANN CARLSON,  
*Acting Administrator,  
National Highway Traffic Safety Administration, 1200 New Jersey Avenue, SE,  
Washington, DC 20590.*

DEAR ADMINISTRATOR CARLSON,

We write to you today because we have serious safety concerns about the lack of data being collected by the Federal government with respect to autonomous vehicles (AVs) now operating freely on the streets of San Francisco, California, and elsewhere around the country. We respectfully ask the National Highway Traffic Safety Administration (NHTSA) to improve its data collection requirements on automobile manufacturers so that policymakers and regulators have the information they need to keep our constituents safe and minimize disruptions to their daily lives, and so that the American people can feel confident in this exciting and important new technology.

Over the past several years, technology companies and automobile manufacturers have made tremendous strides toward a future where safe and reliable AVs are a reality. But we are not there yet. As sophisticated as such software is becoming, AVs on the streets of San Francisco, which we both represent, have been having challenges in addressing complex real-world situations, such as navigating road work zones and reacting to the temporary outage of signals. When AVs malfunction, they frequently shut down in place, which has resulted in the vehicles obstructing public transit routes, blocking intersections and the normal flow of traffic, and preventing first responders from reaching people in need.

On August 10, 2023, the California Public Utilities Commission (CPUC) voted to allow Cruise and Waymo to operate and charge for on-demand paid rides in driverless vehicles (dubbed “robotaxis”) at all times in San Francisco,<sup>1</sup> thereby expanding their use dramatically throughout the city. Even before then, almost 600 incidents had been reported to San Francisco officials since the launch of robotaxis, but the city and county believes this is a fraction of actual incidents. In the months before the CPUC decision, such incidents had skyrocketed from no more than about 30 per month to more than 120 in June 2023 alone (the last month for which data is available).<sup>2</sup> AV car companies do not fully disclose the location, number of, or duration of these incidents, but San Francisco reports, and independent reporting has verified, that they can last up to several hours and have occurred not only throughout the city but also in San Mateo County and in other counties in the Bay Area.<sup>3</sup>

AV incidents are not merely an inconvenience; they endanger the lives of passengers, other drivers, pedestrians, and even individuals with no proximity to the

<sup>1</sup>“CPUC Approves Permits for Cruise and Waymo To Charge Fares for Passenger Service in San Francisco,” California Public Utilities Commission, August 10, 2023, <https://www.cpuc.ca.gov/news-and-updates/all-news/cpuc-approves-permits-for-cruise-and-waymo-to-charge-fares-for-passenger-service-in-sf-2023>.

<sup>2</sup>“CPUC Status Conference: Safety Issues Regarding Driverless AV Interactions with First Responders,” City and County of San Francisco, August 7, 2023, [https://www.sfmta.com/sites/default/files/reports-and-documents/2023/08/2023.08.07\\_cpuc\\_status\\_conference\\_8.7.2023\\_final.pdf](https://www.sfmta.com/sites/default/files/reports-and-documents/2023/08/2023.08.07_cpuc_status_conference_8.7.2023_final.pdf).

<sup>3</sup>Harsha Devulapalli, “Map shows every crash involving driverless cars in San Francisco,” San Francisco Chronicle, August 29, 2023, <https://www.sfchronicle.com/projects/2023/self-driving-car-crashes/>.

vehicles who require emergency services. Just eight days after the CPUC-approved expansion, on August 18, the California Department of Motor Vehicles ordered Cruise to cut its fleet in half following a crash involving a fire truck that resulted in the hospitalization of a Cruise passenger. The San Francisco Fire Department (SFFD) has also logged about 50 incidents in 2023 alone where AVs were obstructing fire station ingress and egress, came in contact with or nearly missed personnel or equipment, or were intruding on or exhibiting unpredictable operations near an SFFD response zone. SFMTA has also reported incidents of Muni vehicles being unable to pass obstructing AVs, which hinders the normal functioning of the transit system and disrupts the schedules of countless riders in the process.

Neither CPUC nor any other state or Federal agency has the data it needs to evaluate the safety of AVs overall, between manufacturers, or as compared to manually operated motor vehicles. We are pleased that NHTSA issued a General Standing Order (SGO) on this issue in June 2021, and most recently amended it on April 5, 2023, requiring manufacturers of Levels 3 through 5 Automated Driving Systems to report crash information to the agency.<sup>4</sup> However, there are several limitations to this data. Incidents that did not end in a “crash” but did involve downstream individuals are not accounted for in the current SGO. So, for example, a vehicle that shuts down in the middle of a street, blocking first responders from being able to reach an individual whose life is threatened need not be reported, despite likely resulting in “deaths and injuries resulting from traffic accidents.”<sup>5</sup> Moreover, NHTSA has not asked for sufficient information from manufacturers to be able to do data normalization to compare systems, so it is currently impossible to accurately evaluate the relative safety of different manufacturers. They are not required to submit how many of their vehicles are on the road, the number of vehicles operating, or the miles traveled.<sup>6</sup>

NHTSA has statutory authority to proactively require motor vehicle manufacturers to hand over data to prevent personal injury, death, and property damage.<sup>7</sup> Meanwhile, AVs already collect detailed information about every moment they operate and, for the most part, that data is sent to manufacturers’ computer systems for analysis and aggregation. We believe NHTSA should require companies to report incident information on a detailed and standardized basis so that the safety record of these vehicles is fully understood and so that companies may be evaluated relative to each other and held accountable. For example, NHTSA could require manufacturers to submit reports on vehicle retrieval events, emergency response interference events, and lane obstruction events that affect public roads but also bike lanes and lanes designated for transit vehicles. The agency should also collect information on the response of vehicles to events that are infrequent but likely to occur at least several times over the course of a vehicle’s operational lifetime, such as traffic signal outages, cellular network outages, and disaster situations.

NHTSA has acknowledged in briefings that the data the agency is currently requiring from manufacturers is insufficient to determine the broader safety of AV technology or to evaluate the safety of specific AV models as compared to manually operated motor vehicles. We urge you to go further than your most recent SGO amendment to enable the comparison of companies’ safety records, and to ask for information that would allow for regulators and the public to draw broader safety conclusions.

If you do have new plans to issue an updated standing order, please share them with us and the public so we can be confident that NHTSA is taking action. We believe you have the authority you need, but if for some reason you do not feel you have the authority to act, please share with us what changes in the law you would need to take appropriate action.

The improved collection of safety data would provide regulators at all levels of government with the clearer picture needed to further implement safeguards—and it could provide the public with more confidence in the safety of this new and important technology. We believe AVs will one day provide safe transportation to millions of people and dramatically reduce traffic and pedestrian deaths, both of which are needlessly high. In the meantime, we need to bring more transparency to this groundbreaking sector.

<sup>4</sup> Standing General Order 2021–01, Second Amended, April 5, 2023.

<sup>5</sup> 49 U.S.C. § 30101.

<sup>6</sup> “Summary Report: Standing General Order on Crash Reporting for Automated Driving Systems,” National Highway Traffic Safety Administration, Department of Transportation, June 2022, <https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-06/ADS-SGO-Report-June-2022.pdf>.

<sup>7</sup> 49 U.S.C. § 30166(g)(1)(A); 49 U.S.C. § 30166(e), (g); 49 C.F.R. Part 510.



On behalf of our constituents, thank you for your attention to this matter of concern.

Best regards,  
KEVIN MULLIN,  
*Member of Congress.*

NANCY PELOSI,  
*Member of Congress.*

[End attachments]

*Question 1.b.* Your organization has conducted several public opinion polls on autonomous vehicles. How would greater transparency improve public confidence and understanding of this technology?

*ANSWER.* Advocates has commissioned opinion polls over the last several years in 2018, 2022 and earlier this year. These polls have consistently revealed that Americans are concerned with driverless cars and trucks on our roadways. The most recent poll results clearly illustrate that people care deeply about road safety and the growing effects of AVs on public roads, and they are highly supportive of rules and protections for this developing technology. While there is widespread concern about the use and deployment of driverless vehicles, 64 percent of Americans feel that their concerns could be adequately addressed by minimum government safety requirements.

Advocates spearheaded the compilation of the “AV Tenets,” a people-and-safety-first approach to AV development and deployment that identifies policy positions which should be a foundational part of any AV policy. This comprehensive approach is based on expert analysis, real world experience, and public opinion and is supported by 65 stakeholders representing safety, consumer, public health, labor, bicyclists, pedestrians, disability rights, smart growth, and others. It has four main, commonsense categories including: 1) prioritizing safety of all road users; 2) guaranteeing accessibility and equity for all individuals including those with disabilities; 3) preserving consumer and worker rights; and, 4) ensuring local control and sustainable transportation.

One of the provisions of the AV Tenets is that consumers must be provided with accurate information on AVs. This type of transparency can boost consumer confidence in the ability of the technology to perform safely, if it is, in fact, doing so. 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 over-the-air (OTA) updates.

*Question 2.* To date, autonomous trucks have not traveled enough miles to give us a representative data sample proving their safety, and the decision on when to launch fully autonomous service is largely left to each individual company.

How can we ensure commercial AVs are safe, and should there be independent or governmental approval prior to these vehicles operating in full self-driving mode on public roadways?

*ANSWER.* The emergence of experimental ACMVs and their interactions with conventional motor vehicles, trucks, buses and all road users for the foreseeable future demand an enhanced level of federal and state oversight to ensure public safety. It is imperative that CMVs, including those with ADS, be regulated by U.S. DOT with enforceable safety standards and subject to adequate oversight.

The potential of an 80,000 pound truck equipped with unregulated and inadequately tested technology on public roads is a very real and dangerous scenario if these vehicles are only subject to voluntary guidelines. In addition, automated passenger carrying CMVs which have the potential to carry as many as 53 passengers will need additional comprehensive federal rules specific to this mode of travel.

At a minimum, ACMVs must be subject to the following essential provisions:

- In the near term, rulemakings must be promulgated for elements of ACMVs that require performance standards including but not limited to the ADS, human machine interface, sensors, privacy, software and cybersecurity. ACMVs must also be subject to a “vision test” to guarantee they properly detect and respond to other vehicles, all people and objects in the operating environment. Also, a standard to ensure ACMVs do not go outside of their operational design domain (ODD) should be issued.
- Drivers operating an ACMV must have an additional endorsement or equivalent certification on their commercial driver’s license (CDL) to ensure they have been properly trained to monitor and understand the ODD of the vehicle and, if need be, to operate an ACMV. This training must include a minimum number of hours of behind-the-wheel training.
- Each manufacturer of an ACMV must be required to submit a safety assessment report that details the safety performance of automated driving systems and automated vehicles. Manufacturers must be required to promptly report to

NHTSA all crashes involving ACMVs causing fatalities, injuries and property damage.

- ACMVs that do not comply with Federal Motor Vehicle Safety Standards (FMVSS) must not be introduced into commerce nor be subject to large-scale exemptions from such.
- Any safety defect involving the ACMV must be remedied before the ACMV is permitted to return to operation. The potential for defects to infect an entire fleet of vehicles is heightened because of the connected nature of AV technology. Therefore, manufacturers must be required to promptly determine if a defect affects an entire fleet. Those defects which are fleet-wide must result in notice to all such owners and an immediate suspension of operation of the entire fleet until the defect is remedied.
- The DOT Secretary must establish a database for ACMVs that includes such information as the vehicle's identification number; manufacturer, make, and the level of automation of each automated driving system with which the vehicle is equipped; the ODD of each automated driving system; and the FMVSS, if any, from which the vehicle has been exempted. Also, when ACMVs move beyond testing into deployment, they should be required to comply with the SGO.
- For the foreseeable future, regardless of their level of automation, ACMVs must have an operator with a valid CDL in the vehicle at all times. Drivers will need to be alert to oversee not only the standard operations of the truck but also the ADS. Therefore, the Secretary must issue a mandatory safety standard for driver engagement. In addition, critical safety regulations administered by Federal Motor Carrier Safety Administration (FMCSA) such as those that apply to driver hours-of-service rules, licensing requirements, entry level training and medical qualifications must not be weakened.
- Motor carriers using ACMVs must be required to apply for additional operating authority.
- FMCSA must consider the additional measures that will be needed to ensure that ACMVs respond to state and local law enforcement authorities and requirements, and what measures must be taken to properly evaluate an ACMV during roadside inspections. In particular, the safety impacts on passenger vehicle traffic of several large ACMVs platooning on bridges, roads and highways must be assessed.
- NHTSA must be given imminent hazard authority to protect against potentially widespread catastrophic defects with ACMVs, and criminal penalties to ensure manufacturers do not willfully and knowingly put defective ACMVs into the marketplace.
- NHTSA and FMCSA must be given additional resources, funding, and personnel, in order to meet demands being placed on the agencies due to the advent of AV technology.

Without these necessary safety protections, commercial drivers and those sharing the road with them are at unacceptable risk. Allowing technology to be deployed without rigorous testing, vigilant oversight, and comprehensive safety standards is a direct and unacceptable threat to the motoring public which is exacerbated by the sheer size and weights of large ACMVs.

#### QUESTION FROM HON. GREG STANTON TO CATHERINE CHASE, PRESIDENT, ADVOCATES FOR HIGHWAY AND AUTO SAFETY

*Question 1.* Ms. Chase, you note in your testimony that new advanced driver assistance systems like automatic emergency braking can save lives. New technology like autonomous vehicles generally requires new training and potentially new skill sets for workers operating and maintaining this equipment. As new equipment is being introduced to our commercial fleet, how much of the benefit of that technology is dependent on investments in workforce training to properly repair and maintain those new systems?

*ANSWER.* Advocates for Highway and Auto Safety (Advocates) has always supported investing in workforce training. For decades, Advocates supported a federal regulation establishing minimum training requirements for entry-level commercial motor vehicle (CMV) drivers. In 2015, Advocates was a member of the Entry-Level Driver Training Advisory Committee (ELDTAC) of the Federal Motor Carrier Safety Administration (FMCSA). The ELDTAC was established to conduct a negotiated rulemaking on entry-level driver training for drivers of CMVs. Advocates continues to urge policy makers to include a minimum number of hours of behind-the-wheel training as part of the standards established by FMCSA in 2016.

Advocates supports workforce training to ensure that CMVs equipped with autonomous driving technology (ACMVs) are properly maintained. In fact, such training is essential to ensuring ACMVs can safely operate on our Nation's roads. As outlined in my written testimony to the Committee, drivers operating an ACMV must have an additional endorsement or equivalent certification on their commercial driver's license (CDL) to ensure they have been properly trained to monitor and understand the operational design domain (ODD) of the vehicle and, if need be, to operate an ACMV. This training must include a minimum number of hours of behind-the-wheel training.

Motor carriers using ACMVs must be required to apply for additional operating authority to ensure the carrier and its employees are qualified to operate ACMVs. In 2022, 22.5 percent of trucks were placed out-of-service (OOS) for maintenance issues. ACMVs will likely require additional inspections in order to ensure proper maintenance. In addition, these vehicles will need to be repaired by trained personnel to ensure they operate safely.

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