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"*

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.[1] 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.[2] 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

[1] NAT'L HWY. TRAFFIC SAFETY ADMIN., *Crash Avoidance Automated Vehicles*, *available at* https://one.nhtsa.gov/Research/Crash- Avoidance/Automated-Vehicles.
[2] 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.

goods. According to the United States Department of Transportation (DOT), there were roughly 1,400 AVs operating nationwide in 2019.[3] By the end of 2022, there were 1,500 AVs operating in California alone.[4] Beyond California, there are robust ongoing AV operations in Arizona, Texas, Nevada, and elsewhere.[5] There are approximately 84 AV companies active in the United States, operating in 30 states and 120 cities.[6]

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.[7]

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

[3] 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://tcrn.ch/3fUunoP.

[4] 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-OII2vlEqY8mTBrtW-N4OJKAQ!LMKJz4QhIaowG5Kw_5cXjA1ip2I1NAsefQaL3UDwP5SXTP7KvZLuHoNFTzRDg64Zjsp1FK4Ef85M3z_fkC_7FRqsX7sRjc-UA4I$.

[5] *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.

[6] *Id*.

[7] *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.

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.[8]

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).[9] Vehicles with levels 0-2 automation are considered equipped with automated driver assistance systems (ADAS). Many vehicles available today are equipped with some automation (levels 1-2), which includes features such as automatic emergency braking and lane centering.[10] 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.[11]

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).[12] Deaths associated with large truck crashes totaled 5,788 in 2021.[13] Crashes involving large trucks represented approximately 13 percent of the total fatal crashes and large truck VMT

[8] *Id*.
[9] 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 [hereinafter AVs for Safety].
[10] *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.
[11] *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/.
[12] 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.
[13] 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.

represented approximately 10 percent of total VMT of all motor vehicles.[14] 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.[15] 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.).[16]

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.[17] 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).[18]

DOT's research has indicated that up to 94 percent of serious crashes involve human factors.[19] However, last year the Chair of the National Transportation Safety Board (NTSB) criticized that statistic as "misleading."[20] More recently, the General Services Administration (GSA) states that 98 percent of crashes are caused by human error.[21] In 2021, NHTSA's data showed that deadly crashes due to behavioral factors increased significantly.[22] For example, alcohol related fatalities increased by 14 percent between 2020 and 2021.[23] 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

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[14] *Id*.
[15] 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.
[16] *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
[17] *See* NAT'L HWY. TRAFFIC SAFETY ADMIN., *Traffic Safety Facts,* (Apr. 2023), *available at* https://www.nhtsa.gov/press-releases/traffic-crash-death-estimates-2022#:~:text=The%20National%20Highway%20Traffic%20Safety%20Administration%20has%20released,as%20compared%20to%2042%2C939%20fatalities%20reported%20for%202021; CENTERS FOR DISEASE CONTROL AND PREVENTION, *Road Traffic Injuries and Deaths – A Global Problem*, (Jan. 10, 2023), *available at* https://www.cdc.gov/injury/features/global-road-safety/index.html.
[18] 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.
[19] 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.
[20] *NTSB's Homendy Calls DOT's Serious Crash Stat Misleading,* TRANSPORTATION TOPICS NEWS (Jan. 18, 2022), *available at* https://www.ttnews.com/articles/ntsbs-homendy-calls-dots-serious-crash-stat-misleading.
[21] GSA., *Crashes Are No Accident*, (last accessed Aug. 31, 2023), *available at* https://drivethru.gsa.gov/DRIVERSAFETY/DistractedDrivingPosterA.pdf.
[22] 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.
[23] *Id*.

increase safety for drivers, passengers, and other road users, and reduce the economic costs of crashes.[24] 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.[25]

For example, in April 2022, a driver-supervised Tu-Simple autonomous truck crashed into a concrete barricade on I-10 in Arizona."[26] 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.[27]

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.[28] Making improvements to roadway infrastructure will be helpful to all users.[29] For example, wider pavement markers could benefit older human drivers in addition to AVs.[30] Today, both AVs and human drivers benefit from contrasting pavement markings, especially in areas of high glare.[31] 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.[32]

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[24] AVs for Safety, *supra* note 9.
[25] *Id*.
[26] 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/.
[27] 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].
[28] 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.
[29] *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).
[30] *Id*.
[31] *Id*.
[32] *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.

Therefore, traffic control devices are not uniform across all states.[33]

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.[34] This rulemaking is underway, and a proposed final rule was submitted to the Office of Management and Budget's Office of Information and Regulatory Affairs (OIRA) on June 13, 2023.[35]

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.[36] After the trip, a driver must prepare and sign a post trip inspection report.[37] Further, every commercial vehicle, including each segment of a combination vehicle, must undergo a periodic inspection at least once every 12 months.[38]

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).[39]

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."[40] 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."[41]

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

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[33] 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.
[34] 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.
[35] OFF. OF MGMT. & BUDGET, EXEC. OFF. OF THE PRESIDENT, BUDGET OF THE UNITED STATES GOVERNMENT, REGULATORY ACTIONS CURRENTLY UNDER REVIEW BY AGENCY (2023).
[36] 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.
[37] *Id*.
[38] *Id*.
[39] *Fixing America's Surface Transportation Act of 2015*, Pub. L. No. 114-94, 129 Stat. 1537.
[40] *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/.
[41] *Id*.

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.[42]

VI. REGULATORY ACTIONS

Federal Actions -

As automated vehicles are still in development, AV regulatory regimes are still in their beginning stages.[43] 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."[44] 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.[45]

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 vehicle safety.[46] NHTSA encourages automated vehicle manufacturers to submit Voluntary Safety Self-Assessments (VSSAs) demonstrating their approaches to safe testing and deployment of AVs.[47] To date, 28 companies have submitted VSSAs to NHTSA.[48] 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.[49] 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.[50]

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[42] *Id*.
[43] Automated Vehicles 4.0, *supra* note 27.
[44] *Id*.
[45] 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.
[46] Automated Vehicles 4.0, *supra* note 27.
[47] 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.
[48] NAT'L HWY TRAFFIC SAFETY ADMIN., *Voluntary Safety Self-Assessment*, *available at* https://www.nhtsa.gov/automated-driving-systems/voluntary-safety-self-assessment.
[49] 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.
[50] 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.

The FMCSA establishes Federal Motor Carrier Safety Regulations (FMCSRs), which set minimum safety standards for motor carriers and drivers.[51] 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.[52] Potentially affected FMCSRs included Licensing and Driver Qualifications, Hours of Service, and Safe Driving.[53] 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.[54] 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.[55] 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.[56] Most of these state actions are intended to encourage AV development and testing.[57] Some of these actions incorporate AVs into the state's broader regulatory framework, including operating authorities, safety standards, licensing and

[51] DOT, FED. MOTOR CARRIER SAFETY ADMIN., *The Motor Carrier Safety Planner*, *available at* https://csa.fmcsa.dot.gov/SafetyPlanner/Default.aspx.
[52] 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.
[53] UNITED STATES DEP'T 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.
[54] 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.
[55] 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.
[56] *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.
[57] *Id*.

registration requirements, and liability laws.[58]

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.[59] 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.[60]

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.[61] Traffic optimization, a potential benefit of AVs, would reduce commuting times.[62] 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.[63] Further, increases in productivity resulting from AVs may result in faster delivery and quicker commuting time.[64] Productivity increases together with operational savings would result in lower trucking freight rates that could be passed on to the consumer.[65]

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

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[58] *Id*.
[59] *Chorus Grows in Opposition of California's Proposed Driverless Truck Ban,* COMMERCIAL CARRIER JOURNAL, (Jul 10, 2023), *available at* https://www.ccjdigital.com/equipment-controls/autonomous/article/15541790/chorus-grows-in-opposition-of-californias-driverless-truck-ban.
[60] 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.
[61] 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.
[62] 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.
[63] 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.
[64] 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/.
[65] 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].

responsibilities and changes in wages and quality of life.[66]

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.[67] 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."[68] 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.[69]

Other segments of the industry cite driver retention as the workforce challenge most plaguing the industry, highlighting driver wages and working conditions as obstacles to attracting and retaining qualified drivers.[70] 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.[71]

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.[72] 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.[73] The report concludes that long-haul drivers will move into short-haul jobs.[74] 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.[75] 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

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[66] *Id*.
[67] *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/HHRG-118-PW00-Wstate-SpearC-20230201.pdf.
[68] *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 [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.
[69] Cassidy, *supra* note 68.
[70] *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.
[71] Automated Vehicles 3.0, *supra* note 65.
[72] 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.ntl.bts.gov/view/dot/54596.
[73] *Id*.
[74] *Id*.
[75] 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.

market today will retire as truck drivers.[76]

Fuel Costs -

Fuel costs are the second highest cost category for the trucking industry.[77] AVs may reduce the amount of fuel required, thereby significantly reducing fuel costs and benefitting the environment.[78] 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.[79] A study shows that platooning with automated trucks can reduce fuel consumption by 10 to 25 percent and reduce emissions.[80]

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.[81] 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.[82] 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.[83] In 2021, the National People's Congress passed an initiative to invest and consolidate resources for scientific and technological laboratories with a focus on researching and developing emerging technologies, including applications like autonomous vehicles.[84]

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

[76] 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.
[77] Automated Vehicles 3.0, *supra* note 65.
[78] *Id*.
[79] *Id*.
[80] Peter Buxbaum, *Vehicle Automation and Carbon Emissions*, GLOBAL TRADE, (Dec. 22, 2016), *available at* https://www.globaltrademag.com/vehicle-automation-carbon-emissions/.
[81] Automated Vehicles 3.0, *supra* note 65.
[82] KLYNVELD 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.
[83] *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.
[84] 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.

Chinese companies are allowed to test in the United States.[85] This concern was recently echoed by United States Secretary of Transportation Pete Buttigieg.[86] 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.[87] It has been reported that the company intends to divest from the American market.[88] 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.[89] Sinotrans is a Chinese State-Owned Enterprise.[90]

IX. WITNESSES

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Mr. Jeff Farrah
Executive Director
Autonomous Vehicle Industry Association

Mr. Chris Spear
President and Chief Executive Officer
American Trucking Associations

Ms. Cathy Chase
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Advocates for Highway and Auto Safety

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[85] *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-execs-on-supply-chains/70335754007/.

[86] 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/.

[87] Kate O'Keeffe, 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.

[88] 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.

[89] 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.

[90] 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.*