

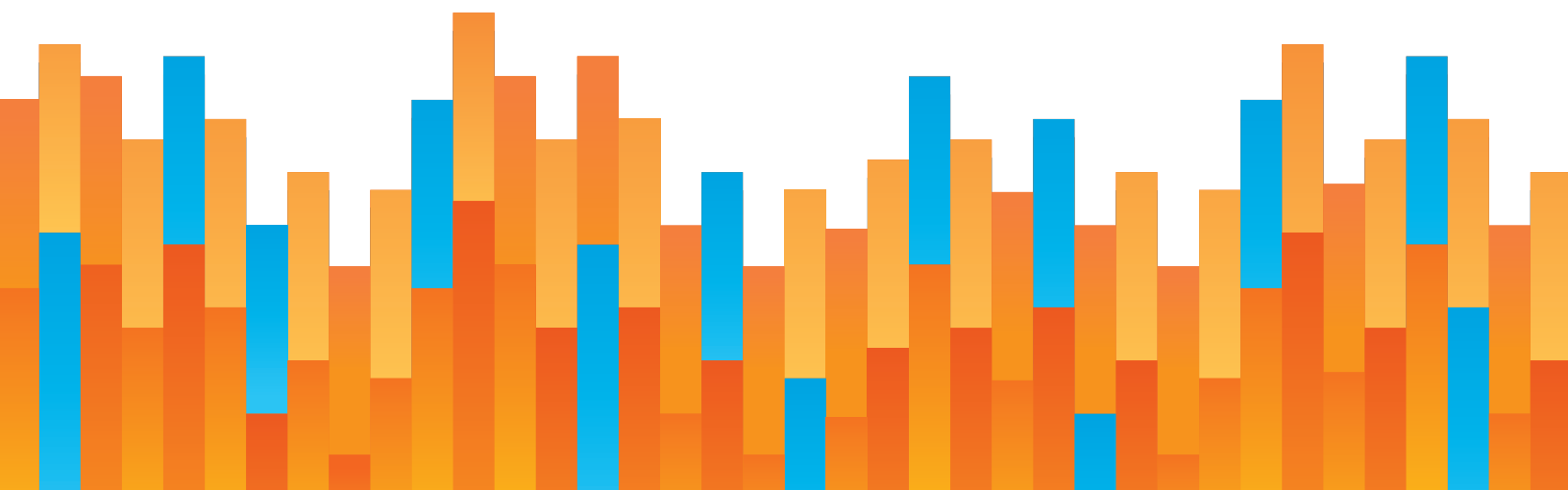


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AUTOMATED VEHICLE POLICY RECOMMENDATIONS FOR THE 118TH CONGRESS

by Marc Scribner

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PART 1

INTRODUCTION

In a 2009 TED Talk, Director of the Stanford Artificial Intelligence Laboratory and Google Vice President Sebastian Thrun set off a firestorm of interest over automated vehicle technology in his announcement that Google was pursuing a world where human beings no longer drive cars.¹ Since then, Google has been joined by numerous technology startups as well as traditional automakers in a joint quest to replace human beings in the driver's seat with sensor arrays and computers.

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Policymakers have also taken interest in these new technologies. A key issue facing both developers and policymakers is ensuring clear communication about the various technologies and features. Fortunately, vehicle automation definitions have been standardized by SAE International through Recommended Practice J3016. When the National Highway Traffic Safety Administration published its first formal automated

¹ Sebastian Thrun, “Rethinking the Automobile,” TEDx Brussels 2010, *TEDx Talks*, 12 Jan. 2011. https://www.youtube.com/watch?v=r_T-X4N7hVQ (24 Feb. 2023).

vehicles guidance policy in 2016, it abandoned its 2013 levels of automation in favor of those defined in SAE J3016.² Congress has also adopted SAE, most formally in the Infrastructure Investment and Jobs Act of 2021.³ States and local policymakers are now generally using SAE J3016 levels of automation as well. SAE International has produced the graphic in Figure 1 to aid policymakers and the public in understanding technology capabilities and driver responsibilities at various levels of automation.

FIGURE 1: SAE J3016 LEVELS OF DRIVING AUTOMATION

		SAE LEVEL 0	SAE LEVEL 1	SAE LEVEL 2	SAE LEVEL 3	SAE LEVEL 4	SAE LEVEL 5
What does the human in the driver's seat have to do?		You <u>are</u> driving whenever these driver support features are engaged – even if your feet are off the pedals and you are not steering			You <u>are not</u> driving when these automated driving features are engaged – even if you are seated in “the driver's seat”		
		You must constantly supervise these support features; you must steer, brake or accelerate as needed to maintain safety			When the feature requests, you must drive	These automated driving features will not require you to take over driving	
What do these features do?		These are driver support features			These are automated driving features		
		These features are limited to providing warnings and momentary assistance	These features provide steering OR brake/acceleration support to the driver	These features provide steering AND brake/acceleration support to the driver	These features can drive the vehicle under limited conditions and will not operate unless all required conditions are met	This feature can drive the vehicle under all conditions	
	Example Features	<ul style="list-style-type: none">• automatic emergency braking• blind spot warning• lane departure warning	<ul style="list-style-type: none">• lane centering OR• adaptive cruise control	<ul style="list-style-type: none">• lane centering AND• adaptive cruise control at the same time	<ul style="list-style-type: none">• traffic jam chauffeur	<ul style="list-style-type: none">• local driverless taxi• pedals/steering wheel may or may not be installed	<ul style="list-style-type: none">• same as level 4, but feature can drive everywhere in all conditions

Source: SAE International

Rather than mere driver assistance provided by lower levels of automation, an automated driving system (ADS) at SAE Levels 3–5 automates the entire driving task. It is here where the traditional relationship between automobiles and human operators breaks down, most of the potential benefits from automation can be realized, and policymaker attention is most warranted.

² National Highway Traffic Safety Administration, “Federal Automated Vehicles Policy,” *Transportation.gov*, U.S. Department of Transportation, 20 Sep. 2016. <https://www.transportation.gov/AV/federal-automated-vehicles-policy-september-2016> (24 Feb. 2023).

³ Infrastructure Investment and Jobs Act, Pub. L. 117–58, 135 Stat. 427 (15 Nov. 2021). § 13006(c).

Improving safety has been a top-stated priority of ADS developers and is especially significant given the long-recognized fact that more than 90% of automobile crashes involve driver error or misbehavior.⁴ The technology also offers great promise for traditionally mobility-disadvantaged groups who—either by disability or lack of income—are unable to drive their own vehicles and then suffer the consequences of reduced access to jobs, medicine, and leisure that poor substitutes such as mass transit cannot come close to matching.⁵



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ADS-equipped vehicles also have the potential to significantly reduce traffic congestion and improve the flow of freight. Brookings Institution economist Clifford Winston and lawyer Quentin Karpilow modeled the economic impacts of congestion reduction in a scenario of widespread ADS adoption in their book, *Autonomous Vehicles: The Road to Economic Growth*.⁶ They estimate that a large reduction in travel delays could raise the annual economic growth rate of the U.S. by at least one percentage point.⁷ While this might seem small, a conservative estimate would still translate to hundreds of billions of dollars in additional annual growth to the economy.

⁴ John R. Treat et al., “Tri-level study of the causes of traffic accidents: Volume 1, Causal factor tabulations and assessments,” National Highway Traffic Safety Administration, *Bts.gov*, Bureau of Transportation Statistics, May 1979. 28. <https://rosap.nhtl.bts.gov/view/dot/1243>. National Highway Traffic Safety Administration, “Report to Congress: National Motor Vehicle Crash Causation Survey,” *Crashstats.nhtsa.dot.gov*, National Center for Statistics and Analysis, July 2008. 25–26. <https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811059>.

⁵ Marc Scribner, “Recalibrating expectations for the true potential of automated vehicles,” *Reason.org*, Reason Foundation, 24 Feb. 2022. <https://reason.org/commentary/recalibrating-expectations-for-the-true-potential-of-automated-vehicles/> (24 Feb. 2023).

⁶ Clifford Winston and Quentin Karpilow, *Autonomous Vehicles: The Road to Economic Growth?* (Washington: Brookings Institution Press, 2020). 69–77.

⁷ Ibid.

Widespread deployment of ADS-equipped vehicles remains years away. Policymakers would be wise to begin preparing for this future today because the automotive safety regulatory framework will also take years to update. Congress' last serious attempt at enacting comprehensive national ADS policy occurred in 2017 and 2018 during the 115th Congress.⁸ This effort ultimately failed. Since then, ADS-related regulatory activity at the U.S. Department of Transportation has slowed.



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This policy brief aims to provide the new 118th Congress with guidance so it can reinvigorate and refocus federal ADS policymaking on productive near-term activities. Part 2 discusses how Congress can ensure ADS-related policies are developed in a sound manner. Part 3 explains the need for temporary regulatory relief and how Congress can simultaneously promote technological innovation while maintaining the high level of safety demanded by the public.

⁸ Safely Ensuring Lives Future Deployment and Research In Vehicle Evolution (SELF DRIVE) Act, H.R. 3388, 115th Congress, 1st Sess. (2017). American Vision for Safer Transportation through Advancement of Revolutionary Technologies (AV START) Act, S. 1885, 115th Congress, 1st Sess. (2017).

PART 2

PROMOTING SOUND REGULATORY POLICY DEVELOPMENT

Under the National Technology Transfer and Advancement Act and subsequent guidance from Office of Management and Budget Circular A-119, federal regulatory agencies are ordered to, whenever possible, rely on voluntary consensus technical standards in lieu of writing government-unique standards.

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In the case of the National Highway Traffic Safety Administration (NHTSA), it can take years to develop a consensus standard and then years more to complete a Federal Motor Vehicle Safety Standard (FMVSS) rulemaking to incorporate that standard into regulation. And once that specific standard is incorporated, it tends to persist in regulation even when it is

subsequently revised by the standards-developing organization. With respect to the persistence of outdated technical standards incorporated in regulation, a review of NHTSA's FMVSS finds that the median technical standard publication year is 1980.⁹

Unlike peer countries in Europe and Asia that impose a form of premarket approval known as type approval, compliance with U.S. auto safety regulations is self-certified by automakers. Matters not covered by existing FMVSS are generally left up to automakers, provided their innovations do not interfere with FMVSS-required components and their operation in a manner that would render the vehicles and components noncompliant. Increasingly, however, new technologies face barriers posed by existing FMVSS that limit these technologies' availability and performance.



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One recent example is adaptive driving beam (ADB) headlamps. ADB headlamps eliminate the high- and low-beam distinction by using a lamp array containing dozens of individual LED bulbs that switch on and off depending on the driving conditions. The LED bulbs are computer-controlled to provide maximum visibility while minimizing glare to oncoming vehicles that are detected by onboard sensors. Drivers at night can then better avoid pedestrians, animals, or other hazards that may appear on roadways—enjoying the safety benefits of high-beam illumination without temporarily blinding oncoming drivers. This technology was widely adopted in Europe and Japan during the previous decade.

FMVSS No. 108 dictates vehicle lighting requirements. Some of the most significant headlamp technical standards incorporated in FMVSS No. 108 were published by the Society of Automotive Engineers (now SAE International) in the 1960s.¹⁰ These standards presumed discrete high- and low-beam headlamps. Regardless of whether the switch is

⁹ Author's analysis of the National Institute of Standards and Technology's Standards Incorporated by Reference (SIBR) Database.

¹⁰ 49 C.F.R. § 571.108.

manual or automatic, federal regulation required that the headlamps in your car must be capable of binary switching between higher and lower illumination settings.

In 2013, Toyota petitioned NHTSA to amend FMVSS No. 108 to permit ADB headlamps.¹¹ SAE International and automakers argued that provisions related to semiautomatic beam-switching systems could allow ADB headlamps to be sold in the U.S., but NHTSA disagreed. As a result of this regulatory resistance, SAE International published a new ADB headlamp standard in 2016, Recommended Practice J3069, to provide NHTSA with the necessary material to amend FMVSS No. 108 and legalize ADB headlamps.¹²

In 2018, NHTSA finally granted Toyota's 2013 petition and published a notice of proposed rulemaking to amend FMVSS No. 108 to incorporate SAE International's ADB headlamp standard, with some modifications.¹³ When NHTSA had still not published a final rule on ADB headlamps by the end of 2021, Congress responded by ordering NHTSA to promulgate one by November 2023.¹⁴ The final rule was ultimately published in February 2022, nearly nine years after Toyota had first petitioned NHTSA on ADB headlamps.¹⁵

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This experience with ADB headlamps suggests NHTSA will have a difficult time modernizing its FMVSS regime to permit the wide range of potential automated driving system (ADS) use cases. Technical standards and standardized test procedures related to

¹¹ Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices, and Associated Equipment, *Notice of Proposed Rulemaking*, National Highway Traffic Safety Administration, Docket No. NHTSA-2018-0090, 83 Fed. Reg. 51,766 (12 Oct. 2018). 51,772.

¹² Ibid.

¹³ Ibid. 51,767.

¹⁴ Infrastructure Investment and Jobs Act, Pub. L. 117–58, 135 Stat. 427 (15 Nov. 2021). § 24212(b).

¹⁵ Federal Motor Vehicle Safety Standards; Lamps, Reflective Devices, and Associated Equipment, Adaptive Driving Beam Headlamps, *Final Rule*, National Highway Traffic Safety Administration, Docket No. NHTSA-2022-0013, 87 Fed. Reg. 9,916 (22 Feb. 2022).

self-driving technologies remain under development. NHTSA itself has estimated that up to 45% of its FMVSS may present obstacles for developers seeking to self-certify ADS-equipped vehicles.¹⁶ If left unchanged, U.S. auto safety regulation may significantly delay the wide deployment of what are expected to be far safer ADS-equipped vehicles.



NHTSA itself has estimated that up to 45% of its FMVSS may present obstacles for developers seeking to self-certify ADS-equipped vehicles. If left unchanged, U.S. auto safety regulation may significantly delay the wide deployment of what are expected to be far safer ADS-equipped vehicles.



Congressional reform is likely needed. One way to better ensure that FMVSS reflect modern technologies, technical standards, and test procedures has already been suggested by Congress in a non-automotive setting.

In regulating all-terrain vehicles (ATVs), Congress requires the Consumer Product Safety Commission to use an ATV standard developed by the American National Standards Institute (ANSI) and requires ANSI, or a successor organization, to notify the Consumer Product Safety Commission when it is considering a revision of the standard.¹⁷ When ANSI or its successor notifies the CPSC of a revision to an ATV safety standard, the Commission has 120 days to either initiate a rulemaking proceeding “to include any such revision that the Commission determines is reasonably related to the safe performance of all-terrain vehicles” or “notify [ANSI] of any provision it has determined not to be so related.”¹⁸

Congress could include a similar update trigger mechanism for NHTSA’s FMVSS. Such a mechanism would not force NHTSA to adopt new or revised technical standards in

¹⁶ Anita Kim et al., “Review of Federal Motor Vehicle Safety Standards (FMVSS) for Automated Vehicles,” John A. Volpe National Transportation Systems Center, *Ntl.bts.gov*, National Transportation Library, 11 March 2016. <https://rosap.ntl.bts.gov/view/dot/12260> (3 March 2023).

¹⁷ 15 U.S.C. § 2089.

¹⁸ Ibid.

regulation, but it would force a decision on whether to adopt or not—and if not, explain why not. For example, 49 U.S.C. § 30111 could be amended to add a new subsection (g):

(g) Revisions to Voluntary Consensus Standards:

(1) If a voluntary consensus standards body revises a voluntary consensus standard incorporated in whole, in part, or by reference in any motor vehicle safety standard prescribed under this chapter, it shall notify the Secretary of the revision. The Secretary shall publish a notice in the Federal Register to inform the public of the revision unless, within 120 days after receiving notice of the revision and after opening a period for public comment on the new standard, the Secretary notifies the voluntary consensus standard body that the Secretary has determined that the revised voluntary consensus standard or any provision thereof does not meet the need for motor vehicle safety, or is otherwise inconsistent with the purposes of this chapter.

(2) If the Secretary does not reject a voluntary consensus standard revised by the voluntary consensus standard body as described in paragraph (1), the Secretary shall promptly make any conforming amendments to the regulations and standards that are necessary. The revised voluntary consensus standard shall apply for purposes of this chapter.

In addition to allowing superior, safer technologies to come to market more rapidly, refocusing NHTSA on keeping its auto safety regulations reflective of ever-improving technology could reduce its discretion to initiate extraneous rulemaking projects and provide greater transparency to the motor vehicle safety regulatory process. ADS standards development remains at an early stage, so reforming the process by which NHTSA incorporates voluntary consensus technical standards into FMVSS could yield substantial benefits when ADS-related technical standards are published and revised in the future. Congress and NHTSA should investigate the resource needs required by NHTSA to carry out this reformed process.

PART 3

PROVIDING TEMPORARY REGULATORY RELIEF FOR DEVELOPERS

The National Highway Traffic Safety Administration's (NHTSA) experience with past rulemakings suggests that modernizing Federal Motor Vehicle Safety Standards (FMVSS) to incorporate automated driving system (ADS) technologies may take years even after relevant voluntary consensus technical standards are published. ADS developers wishing to bring their technologies to market prior to the promulgation of new or amended safety regulations will likely need to seek temporary FMVSS exemptions.

Under current law, FMVSS exemptions limit ADS developers to 2,500 vehicles per year for two years, with an opportunity to renew the exemption for another two years.¹⁹ For comparison, established parcel carriers operate hundreds of thousands of delivery vehicles, and ride-hailing firms have more than a million drivers in the U.S. A 2020 report commissioned by Nuro estimates that a quarter million to two million ADS-equipped light-duty delivery vehicles will be needed to meet U.S. customer demand by 2030.²⁰ Ten

¹⁹ 49 U.S.C. § 30113(d)–(e).

²⁰ “Economic Impacts of Autonomous Delivery Services in the US,” *Steergroup.com*, Steer Davies & Gleave Limited, 10 Sep. 2020. https://www.steergroup.com/sites/default/files/2020-09/200910_%20Nuro_Final_Report_Public.pdf (3 March 2023).

thousand exempt vehicles over four years per manufacturer are not nearly enough to allow providers of ADS-enabled services such as taxis and last-mile delivery to scale nationwide.



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Both the SELF DRIVE and AV START Acts from the 115th Congress in 2017–2018 would have substantially increased the annual FMVSS exemption cap for ADS-equipped vehicles from 2,500 to 100,000 and at least 80,000, respectively.²¹ Both bills would have also increased the length of the exemption period from two years to four years, with the potential for renewing the exemption for an additional four years.²²

To date, NHTSA has granted only one exemption request for a noncompliant ADS-equipped vehicle, which was for Nuro's R2X zero-occupant low-speed delivery vehicle in February 2020.²³ In July 2021, Ford submitted an exemption petition for an ADS-equipped vehicle that is designed to be operated in both conventional human-driven mode and ADS-driven mode.²⁴ In February 2022, General Motors submitted an exemption petition for its ADS-equipped Cruise Origin, which is not equipped with manual driving controls.²⁵ Both of these exemption petitions remain pending.

²¹ SELF DRIVE Act. § 6; AV START Act. § 6.

²² Ibid.

²³ Nuro, Inc.; Grant of Temporary Exemption for a Low-Speed Vehicle With an Automated Driving System, *Notice*, National Highway Traffic Safety Administration, Docket No. NHTSA-2019-0017, 85 Fed. Reg. 7,826 (11 Feb. 2020).

²⁴ Ford Motor Company-Receipt of Petition for Temporary Exemption From Various Requirements of the Federal Motor Vehicle Safety Standards for an Automated Driving System-Equipped Vehicle, *Notice*, National Highway Traffic Safety Administration, Docket No. NHTSA-2022-0066, 87 Fed. Reg. 43,602 (21 July 2022).

²⁵ General Motors-Receipt of Petition for Temporary Exemption From Various Requirements of the Federal Motor Vehicle Safety Standards for an Automated Driving System-Equipped Vehicle, *Notice*, National Highway Traffic Safety Administration, Docket No. NHTSA-2022-0067, 87 Fed. Reg. 43,595 (21 July 2022).

Raising the annual FMVSS exemption cap is the most important action Congress can take to support the safe deployment of ADS-equipped vehicles in the near-term while technical standards and FMVSS remain under development. Requiring developers to demonstrate an equivalent level of safety or better prior to granting an exemption—a condition long required under most conventional exemption categories—should be maintained for noncompliant ADS-equipped vehicles. Coupled with this mandated safety assurance, Congress should increase the annual FMVSS exemption cap for ADS-equipped vehicles to at least 100,000 to ensure that the public is not denied safer and more-efficient transportation options prior to the promulgation of ADS-specific FMVSS. Congress should also double the exemption and renewal periods to four years, as well as require NHTSA to act promptly on exemption petitions.



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Because these exemptions would still require ADS developers to demonstrate that their non-compliant vehicles achieve an equivalent level of safety or better as conventional FMVSS-compliant vehicles, the data and analysis supporting exemption applications would be extremely valuable to regulators as they attempt to modernize the FMVSS to incorporate ADS in the coming years. A 2020 RAND Corporation study found that the traditional analytical tools and metrics used by NHTSA are generally not suitable for emerging ADS technologies.²⁶ As such, new tools and metrics will need to be developed and the FMVSS exemption process is perhaps the best way for regulators to gain insight into the various safety cases being made by ADS developers.

²⁶ Marjory S. Blumenthal et al., “Safe Enough: Approaches to Assessing Acceptable Safety for Automated Vehicles,” RAND Corporation, 2020. https://www.rand.org/pubs/research_reports/RRA569-1.html (8 March 2023).

PART 4

CONCLUSION

Congress has a difficult task ahead of it in crafting policies to support the development and deployment of automated driving systems. The large amount of uncertainty surrounding developer testing progress, deployment dates, and technical standardization complicates this process. However, despite this uncertainty, Congress can chart a responsible path forward. With small amendments to existing statutes, Congress can prepare federal regulators who are tasked with implementing policy and ensuring that a high level of safety is maintained.

The recommendations contained in this brief should be viewed as “no regrets” policies that can be undertaken with minimal risk to either automated driving system development or the public interest. Modernizing the regulatory framework to allow for the more rapid uptake of technology knowledge must be paired with the recognition that this effort will take time to bear fruit, which necessitates a related modernization of exemptions from that regulatory framework as a safety valve.

Going forward, there will be much more policymaking and fine-tuning of existing policies to better match the technological, economic, and social issues that may arise from automated driving system deployment. Fortunately, while the pace of development has been rapid, policymakers still have plenty of time to get policy right to maximize the benefits of the technology.

ABOUT THE AUTHOR

Marc Scribner is a senior transportation policy analyst at Reason Foundation.

Scribner's work focuses on a variety of public policy issues related to transportation, land use, and urban growth, including infrastructure investment and operations, transportation safety and security, risk and regulation, privatization and public finance, urban redevelopment and property rights, and emerging transportation technologies such as automated road vehicles and unmanned aircraft systems. He frequently advises policymakers on these matters at the federal, state, and local levels.

Scribner has testified before Congress at the invitation of both Democrats and Republicans on issues including highway revenue collection, traffic congestion management, and airport financing. He is a member of the Transportation Research Board's Standing Committee on Emerging Technology Law.

He has appeared on television and radio programs in outlets such as Fox Business Network, National Public Radio, and the Canadian Broadcasting Corporation, and has also written for numerous publications, including *USA Today*, *The Washington Post*, *Wired*, *CNN.com*, *MSNBC.com*, *Forbes*, and *National Review*. And his work has been featured by *The Wall Street Journal*, *New York Times*, *Washington Post*, *Los Angeles Times*, *Scientific American*, *Congressional Quarterly*, *Washington Monthly*, *POLITICO*, CNN, Bloomberg, BBC, C-SPAN, and other print, television, and radio outlets.

Scribner joined Reason Foundation in 2020 after more than a decade at the Competitive Enterprise Institute, where he was a senior fellow in transportation policy. He received his undergraduate degree in economics and philosophy from George Washington University.

