

- 4) Requires CARB to adopt rules and regulations that would reduce the state's GHG emission levels to 1990 levels by 2020.
- 5) Provides CARB with primary responsibility for control of mobile source air pollution, including adoption of rules for reducing vehicle emissions and the specification of vehicular fuel composition.
- 6) Establishes the Clean Miles Standard and Incentive Program which requires CARB to adopt and the CPUC to implement, annual targets and goals, beginning in 2023, for the reduction of per-passenger-mile GHG emissions of vehicles used by TNC drivers.
- 7) Sets via EO-79-20 set a goal of 100% ZEVs for in-state sales of new passenger cars and trucks by 2035, and 100% of medium- and heavy duty- vehicles operating in the state be ZEVs by 2045 where feasible.

This bill:

- 1) Prohibits, beginning January 1, 2025, the DMV from accepting an application for original or renewal registration of a “qualifying autonomous vehicle,” as defined, unless that vehicle is a zero-emissions vehicle.
- 2) Defines a “zero-emission vehicle” as a self-propelled vehicle that produces no tailpipe emissions of criteria pollutants, toxic air contaminants, and greenhouse gases from the qualifying autonomous vehicle when stationary or operating, including idling, as determined by the State Air Resources Board.
- 3) Defines a “qualifying autonomous vehicle” as a vehicle that is:
 - a) Equipped with technology that makes it capable of operation that meets the definition of Levels 4 or 5 of the SAE International's “Taxonomy Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, standard J3016 (SEP2016),” as may be revised.
 - b) Permitted by the DMV for deployment.

COMMENTS:

- 1) *Author's Statement.* “California has set ambitious and necessary climate goals, namely 5 million zero-emission (ZEVs) by 2030 and all new passenger vehicles to be ZEVs by 2035. Automated vehicles (AVs) can be part of a clean, equitable transportation system provided they are electric, result in increased

pooling of trips, and support a multi-modal, high-occupancy transportation system. Smart policies are needed to steer AV deployment, along with other parts of the transportation system, towards a shared, electric future. One important policy is to establish requirements that future AVs be zero-emission. SB 500 helps California move toward this electric future by requiring autonomous vehicles (AVs) to be ZEVs by 2025.”

- 2) *Summary of the bill.* SB 500 would prohibit the DMV, starting January 1, 2025, from registering a qualifying AV unless it is also a zero-emission vehicle (ZEV). SB 500 defines a ZEV specifically as a vehicle that produces no tailpipe emissions, as determined by CARB, so a battery electric or fuel cell electric vehicle would qualify as a ZEV, but a plug-in hybrid would not, for the purposes of this bill. Furthermore, SB 500’s ZEV requirement would not apply to AVs that are still in the testing phase or that do not reach the highest levels of automation (level 4 or 5, see below).

Because SB 500 would prohibit the DMV from accepting applications or original *or renewal* registrations, it would essentially require any qualifying AV that is not fully electric to be retired and taken out of operation, starting 2025.

- 3) *Levels of automation.* SB 500 deals with vehicles where the automated driving system, not a human driver, are in control of the driving task. SAE International (SAE) defines levels of automation, ranging from SAE Level 0 (no automation) to SAE Level 5 (full automation under all conditions). Level 2 vehicles may include partially automated features such as lane assist and adaptive cruise control but still require the full engagement of the driver. For Level 3 vehicles, the automated driving system performs all aspects of the dynamic driving task, but the driver must be ready to take control. Level 4 vehicles are fully automated in certain conditions (e.g. on freeways) while Level 5 vehicles would provide full-time automated performance of all aspects of the driving task in all conditions.
- 4) *Background on California AV policy and regulation.*

DMV. In 2012, SB 1298 (Padilla) established conditions for the operation of automated vehicles (AV) in California. In 2014, the DMV adopted regulations for the testing of AVs on public roads requiring a test driver and established an application and approval process for a testing permit. In early 2018, the DMV adopted regulations for testing AVs without a driver at the wheel and for deployment of AVs in California. DMV began accepting applications for these permits on April 1, 2018. So far, only one company has been authorized to deploy AVs, but many others are in the testing phase: the DMV has issued 56

autonomous vehicle testing permits (with a driver) and 6 autonomous vehicle driverless testing permits.

CPUC administers safety oversight and enforcement of passenger carriers, including limousines, transportation network companies, and any AVs operated as passenger carriers. In 2018, the CPUC authorized two pilot programs that allowed participating companies to transport members of the public as passengers in AVs- either driverless or accompanied by a driver. The pilot programs did not allow permit holders to charge fares. So far, seven companies have received CPUC pilot program permits. In 2020, the CPUC created two new deployment programs, one drivered and one driverless, which will allow participants to offer passenger service, shared rides, and accept monetary compensation for rides in autonomous vehicles. To participate in the CPUC AV programs, companies must also hold AV permits from the DMV.

CalSTA. Because AVs have the potential to transform every sector of transportation, there is also policy coordination needed across state agencies. The California Transportation Agency (CalSTA) has been facilitating this work via an interagency workgroup, which recently released draft vision and guiding principles “intended to provide a framework under which California will define policies, strategies and actions to guide the development and integration of autonomous vehicles into our communities.

- 3) *Uncertainty about AVs*. AVs could enhance vehicle safety by removing human error from the driving task and improve access to mobility for many people. The path for AVs is also complicated by highly publicized accidents as well as concern for the impact on our workforce. Results may vary across different sectors of the burgeoning AV market as well, from personally-owned AVs, to potentially shared fleets, to goods movement and heavy duty AV trucking.
- 4) *AVs and the environment*. So far, AVs have barely been deployed on California’s streets. While the potential climate and congestion impacts AVs bring appear substantial, they are so far mostly theoretical. AVs could increase VMT by up to 33% and become common on the roads within decades, according to the California Transportation Plan 2050. According to different studies, anywhere from 20 percent to 95 percent of miles traveled on U.S. roads could be in automated vehicles by 2030.¹ According to one report, fully automated taxi fleets could become a reality between 2023 and 2030. AVs could offer congestion relief, optimization of roadway capacity, less demand for parking, and improved opportunities for pooling. However, if not properly

¹ California Transportation Plan 2050

regulated, AVs could create more congestion and sprawl, as it becomes more convenient to use the “free” time of riding in AVs for other tasks such as work or to send AV on “zero-occupant” trips as people are dropped off and send their vehicles home or elsewhere. AVs could replace transit trips, or it could provide better first- and last-mile connectivity to increase transit use. At the vehicle level, AVs could improve fuel efficiency by smoothing the frequent starts and stops in congestion but AV technology also requires additional energy to power and externally mounted AV equipment may decrease aerodynamics. The degree to which they are shared and electrified will determine the impact that AVs will have on VMT, accessibility, and other planning goals.

By prohibiting the DMV from registering AVs that are not zero-emission starting in 2025, SB 500 aims to ensure the rise of AVs does not mean a rise in GHGs. Transportation GHG and criteria pollutant emissions are the product of two factors: how much vehicles emit per mile and the total number of miles traveled (VMT). By addressing the former, SB 500 tackles what is arguably the easier regulatory problem. With more ZEVs on the road, we could see significant reductions in GHG emissions, yet traffic congestion may continue to rise.

SB 500 takes a preemptive, arguably premature, approach by accelerating the adoption of ZEVs in the AV sector far ahead of implementation of existing regulations and EO N-79-20. There is a substantial body of research supporting the expectation that automation will increase VMT on the passenger side², though this does not appear to have yet been observed in real-world AV deployment. However, there is very little research on the VMT changes that may come with the automation of the heavy-duty sector. While there are many reasons why automation could increase or decrease VMT when it comes to goods movement, the actual evidence linking heavy-duty automation to potential climate impacts is severely limited at this point.

- 5) *Timing is everything.* SB 500 plans for a California with significant AV deployment. However so far, AVs are still quite nascent. Only one company has a DMV deployment permit at this time, and on the heavy-duty side, there are not even regulations in place to allow for AV testing.

² “Keeping Vehicle Use and Greenhouse Gas Emissions in Check in a Driverless Vehicle World,” Policy Brief, Circella et al. (2017). *Three Revolutions. Steering Automated, Shared, and Electric Vehicles to a Better Future*, Dan Sperling (2018). California Transportation Plan 2050.

6) *Committee concerns.*

- a) Penalizing early adopters. Making it impossible for an AV owner to renew register of their preexisting AVs starting in 2025 penalizes early adopters. ***The author and committee may wish to consider limiting the ZEV requirement to newly registered vehicles.***
- b) Focus on the right vehicles. There does not appear to be much evidence that automating the heavy-duty sector will increase VMT. Nor is the issue urgent; California does not even allow the testing, let alone deployment, of heavy-duty ZEVs in California yet. Finally, heavy-duty ZEV technology is still being developed, as recognized by the ten year gap between the 100% ZEV sales targets between light duty (2035) and heavy-duty (2045) in EO-N-79-20. ***The author and committee may wish to consider focusing the bill in light-duty vehicles, including larger light duty vehicles such as pick-up trucks and minivans.***
- c) Too much too soon? AVs tested in California are commonly hybrids, plug-in-hybrids or fully electric. However, only some AV companies are already working on all-electric platforms, while others may need time to come into compliance with a zero-emission requirement. The short timeframe of a 2025 implementation date arguably picks winners and losers, and could delay AV deployment and innovation, without strong climate benefits.

Furthermore, there are priorities in addition to climate that need to be examined and balanced as AVs are deployed: safety first and foremost, also how they can be deployed equitably, in ways that support pooling, promote disability accessibility, mitigate congestion impacts, support good jobs, and encourage innovation in California. There are still limited options for larger passenger ZEVs suitable for wheel chair accessibility, for example, so an inflexible 2025 implementation date could have unintended consequences including limiting accessibility of AV services. Successfully transitioning to ZEV AVs will also rely on sufficient ZEV charging and fueling infrastructure across varied potential AV applications (for example, personal use, ridehailing, urban or intercity travel).

A 2025 implementation date would require AVs to transition to ZEVs a decade before the Governor's EO targeting 100% light-duty ZEV sales generally at a time when more, not less, consistency and coordination among state ZEV policies is needed. ***The author and committee may wish to***

consider delaying SB 500's implementation date to 2030 in order to build on the timeline of the EO, while accelerating the ZEV transition for light-duty AVs given their likelihood of increasing VMT.

- 7) *Arguments in support.* In support of the bill, environmental groups including the Union of Concerned Scientists writes that “Automated vehicle, or autonomous vehicle (AV), technology may become the most significant change in transportation since the mass introduction of automobiles early last century. Last year, autonomous vehicles traveled almost 2 million miles on California’s public roads. Without proactive policy, widespread use of AVs could increase global warming emissions and single occupancy trips, worsen vehicle congestion, exacerbate air pollution, and deepen inequalities within our current transportation system. Fortunately, this new technology also has a tremendous potential to be part of a clean, equitable transportation system provided that they are electric, result in widespread pooling of trips, and support a multi-modal, high-occupancy transportation system. Smart policies are needed to steer AV deployment, along with other parts of the transportation system, towards a shared, electric future. One important policy is to establish requirements that future AVs be zero-emission.”

Also writing in support, Cruise, Nuro, and Zoox write, “Our electric AV services can play an important role in how the State of California addresses emission reduction in the light-duty vehicle sector. Our vehicles will help reduce emissions and congestion by reducing the number of personal vehicle trips through shared rides or batched deliveries, improved routing, and replacing trips that would otherwise be done with internal combustion engine cars and trucks with autonomous, electric vehicles. We currently have, or plan to have, zero-emission, light-duty AVs operating in California by 2025.”

- 8) *Arguments in opposition.* In opposition, several technology, industry, and trucking organizations, including the Self-Driving Coalition for Safer Streets, write that, “AV technology offers the potential to save lives, enhance mobility, and increase freight efficiency. The National Highway Traffic Safety Administration (“NHTSA”) estimates that more than 36,000 Americans died in motor vehicle crashes in 2018. The overwhelming majority of those crashes occurred due to human error. Fully autonomous vehicles have the potential to reduce fatal traffic crashes and therefore, hold the potential to save lives.

In the context of emissions, AVs are helping to lead the way on reducing emissions, with numerous companies already using battery electric vehicles

(“EVs”) or gasoline-electric hybrids for their AV fleets, and adoption of EVs is increasing. Although we anticipate that many companies will increasingly use EVs for AV testing and deployment as they are able to do so from a technology and business strategy perspective—consistent with various companies’ commitments to electrification, sustainability, and reducing emissions—imposing electrification requirements on AV entities within 4 years would impede the ability for numerous AV entities to operate in California...

In addition to delaying the ability for many AV entities to operate in California in the near-term, SB 500’s ambitious goals would entirely restrict operations of automated heavy duty vehicles. Heavy duty long-haul freight trucks play a vital role in California, with nearly 80% of California communities depending exclusively on trucks to bring the things they need most, including food, health care supplies, and consumer goods. SB 500 would require automated trucks to meet the electrification goals 20 years earlier than the Governor’s own ambitious goals, and well before battery technology and charging infrastructure actually exist to support heavy duty freight trucks on long-haul routes.”

RELATED LEGISLATION:

SB 66 (Allen, 2021)— creates the California Council on the Future of Transportation to provide recommendations in state policy to ensure that, as AVs are deployed, they enhance the state’s efforts to increase road safety, promote equity, and meet public health and environmental objectives. *SB 66 is pending in Senate Transportation Committee.*

SB 570 (Wieckowski, 2021)— exempts an AV that is designed to be operated exclusively and at all times by autonomous technology from any state law or regulation requiring the installation or maintenance of vehicle equipment that relates to or support motor vehicle operation by a human driver. *SB 570 is pending in Senate Transportation Committee.*

AB 859 (Irwin, 2021)— among other things, limits the data a public agency may require a mobility services operator to provide the agency and includes AVs in the definition of “mobility devices.” *AB 859 is pending in the Assembly Committee on Privacy and Consumer Protection*

SB 336 (Dodd, 2019)— would have required an on-board employee when public transit agencies deploy autonomous transit vehicles. *Died in the Assembly Transportation Committee.*

SB 59 (Allen, 2019) — directs the chair of the California Transportation Commission (CTC) to establish an advisory committee—the California Council on the Future of Transportation—to provide the Governor and Legislature with recommendations for changes in state policy to ensure California’s leadership in autonomous, driverless and connected vehicle technology. *Died in the Assembly Appropriations Committee*

SB 936 (Allen, 2018) — requires OPR to convene an Autonomous Vehicles Smart Planning Task Force. *This bill failed passage in the Senate.*

SB 802 (Skinner, 2017) — required OPR to convene an Emerging Vehicle Advisory Study Group to review and advise the Legislature on policies pertaining to new types of motor vehicles operating in California, including AVs. *Died in the Assembly Committee on Appropriations.*

SB 1298 (Padilla, Chapter by the Secretary of State, Chapter 570, Statutes of 2012) — established conditions for the operation of AVs upon public roadways.

FISCAL EFFECT: Appropriation: No Fiscal Com.: No Local: No

POSITIONS: (Communicated to the committee before noon on Wednesday, April 7, 2021.)

SUPPORT:

Union of Concerned Scientists (Sponsor)
350 Bay Area Action
350 Silicon Valley
California Interfaith Power & Light
California State Association of Electrical Workers
Coalition for Clean Air
Coalition of California Utility Employees
Community Environmental Council
Cruise LLC
Elders Climate Action, Norcal and Socal Chapters
Electric Vehicle Charging Association
Environment California
Nuro, INC.
Plug in America
Sierra Club California
SPUR
Zoox, INC.

OPPOSITION:

American Trucking Associations, INC.
Association for Unmanned Vehicle Systems International
California Chamber of Commerce
California Trucking Association
Internet Association; the
Netchoice
Self-driving Coalition for Safer Streets
Silicon Valley Leadership Group
Technet

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