

Date of Hearing: June 21, 2021

ASSEMBLY COMMITTEE ON TRANSPORTATION

Laura Friedman, Chair

SB 500 (Min) – As Amended May 25, 2021

SENATE VOTE: 29-7

SUBJECT: Autonomous vehicles: zero emissions

SUMMARY: Requires the Department of Motor Vehicles (DMV) to approve operation of certain autonomous vehicles (AV) only if they are certified by the California Air Resources Board (CARB) to produce no tailpipe emissions of criteria pollutants, toxic air contaminants, and greenhouse gases when stationary or operating, including idling by 2030. Specifically, **this bill:**

- 1) Imposes the above requirement on highly autonomous vehicles that are under 10,001 pounds.
- 2) Defines “highly autonomous vehicle” to mean an autonomous vehicle with or without a driver that meets the definition of Level 4 or 5 of SAE International’s “Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, standard J3016 (SEP2016),” as may be revised.

EXISTING LAW:

- 1) Authorizes the operation of AVs on public roads for testing purposes under certain circumstances specified in regulations adopted by DMV.
- 2) Defines “autonomous vehicle” to mean any vehicle with autonomous technology that has been integrated into that vehicle.”
- 3) Defines “autonomous technology” to mean technology that has the capability to drive a vehicle without the active physical control or monitoring by a human operator.
- 4) States that an AV does not include a vehicle that is equipped with one or more collision avoidance systems, including, but not limited to, electronic blind spot assistance, automated emergency braking systems, park assist, adaptive cruise control, lane keep assist, lane departure warning, traffic jam and queuing assist, or other similar systems that enhance safety or provide driver assistance, but are not capable, collectively or singularly, of driving the vehicle without the active control or monitoring of a human operator.
- 5) Prohibits the operation of AVs on public roads for non-testing purposes unless the manufacturer of the vehicles submits an application to DMV that is approved pursuant to DMV regulations.
- 6) Requires DMV, by January 1, 2015, to adopt regulations setting forth requirements for the application to operate AVs on public roads for non-testing purposes.
- 7) Requires DMV to approve an application submitted by a manufacturer for the operation of AVs for non-testing purposes if DMV finds that the applicant has submitted all information

and completed testing necessary to satisfy DMV that the AVs are safe to operate on public roads and the applicant has complied with all requirements specified in DMV regulations.

- 8) Authorizes DMV to impose additional requirements it deems necessary to ensure the safe operation of AVs if those vehicles are capable of operating without the presence of a driver inside the vehicle.
- 9) By January 1, 2021, 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 Transportation Network Company (TNC) drivers, including AVs.
- 10) Directs CARB to delay adoption, and CPUC to delay implementation, of the specified program targets and goals if either finds there to be unanticipated barriers to expanding usage of ZEVs by TNCs.
- 11) Requires the CPUC to a) ensure minimal negative impact on low-income and moderate-income drivers; b) ensure that the specified program complements and supports specified sustainable land-used objectives; c) support the goals of clean mobility for low- and moderate-income individuals; and d) advance the goals of the specified program in reviewing utility transportation electrification applications and encourage collaboration between specified stakeholders that would support the specified program.

Existing DMV regulations:

- 1) Defines an “autonomous test vehicle” as a vehicle equipped with technology that makes it capable of operation that meets the definition of Levels 3, 4, or 5 of the SAE International's Taxonomy and Testing of Autonomous Vehicles Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles, standard J3016 (SEP2016).
- 2) Requires AV manufacturers to have a testing or deployment permit to operate an autonomous vehicle in California.
- 3) Restricts the testing and deployment of autonomous vehicles to vehicles under 10,001 pounds and excludes motorcycles.

Clean Mile Standard regulations:

- 1) Defines “autonomous vehicles” to have the same meaning as the vehicle code.
- 2) Requires TNCs, including autonomous vehicles, with an annual vehicle miles (VMT) traveled more than 5 million in a given calendar year to have 90% of their VMT be zero emission by 2030.

FISCAL EFFECT: Unknown

COMMENTS: In 2012, the Legislature passed SB 1298 (Padilla), Chapter 570, Statutes of 2012, which permitted AVs to be operated on public roads for testing purposes by a driver under certain conditions. In 2014, DMV released regulations to allow for the testing of AV's with a test driver, and in April 2018, DMV finalized regulations for the testing and deployment of AV's

on public roads without a driver, with certain limitations. 58 companies currently have a testing permit with a driver, and eight companies have received a testing permit without a driver. One company has received a deployment permit.

AVs have the potential benefit of saving hundreds of thousands of lives. According to the National Highway Traffic Safety Administration (NHTSA), 94% of all vehicle collisions are the result of human error. From 2000 to 2017, 620,709 individuals were killed in a car collision on American roads.

Yet, non-electrified AVs, especially those operating as “robo taxis”, also have the potential to have negative environmental and transportation impacts by significantly increasing VMT, resulting in increased congestion, and GHG emissions. Similar to the effect the state has already seen with TNCs.

According to *Three Revolutions, Steering Automated, Shared, and Electric Vehicles to a Better Future*, written by CARB board member and Director of University of California’s Institute of Transportation Studies Daniel Sperling, “In a study of urban passenger travel worldwide, researchers at the University of California, Davis, estimated that with driverless cars, but with little pooling and electrification, GHG emissions would increase 50% and vehicle use 15 to 20% between now and 2050.” In contrast, “where driverless cars are pooled and electrified, vehicle use would drop by 60% compared to business as usual, GHG emissions would drop by 80%, and overall cost of vehicles, fuel use, and infrastructure would drop by more than 40%-- representing a savings of \$5 trillion per year.”

California and electrification of vehicles. According to CARB, the transportation sector accounts for roughly 40% of the state’s GHG emissions.

The federal government has granted California the authority to set its own emissions standards, so long as they are more stringent than the federal standards. Using that authority, in 1990 California introduced the country’s first ZEV mandate. After the introduction of GM’s prototype electric vehicle, Impact, CARB introduced a ZEV mandate to require 2% of all vehicle sales to be ZEVs by 1998 and 10% by 2003. According to *Three Revolutions*, “When CARB issued its 10% by 2003 ZEV requirement in 1990...it motivated the US government in 1991 to launch the Advanced Battery Consortium, a large applied research and development program intended to help US industry leap beyond lead-acid batteries to the next generation for more powerful and compact batteries.”

According to *Three Revolutions*, that mandate was far too aggressive, in large part because battery technology at the time made ZEV vehicles too costly. In 2003, CARB weakened its mandate, and in 2007 under Governor Schwarzenegger introduced a smaller EV and plug-in hybrid mandate. In 2012, CARB proposed “an aggressive strengthening of the ZEV mandate, requiring automakers to produce approximately 1.5 million electric vehicles (EVs) by 2025, representing about 15% of all sales in that year.

In April 2018, recognizing that TNCs can increase VMT and their potential role in increasing or reducing GHG emissions, the CPUC released a whitepaper, *Electrifying the Ride-Sourcing Sector in California: Assessing the Opportunity*, to “(1) serve as a useful starting point for the CPUC to assess the opportunity for GHG reduction in the TNC sector through increased use of EVs, (2) offer framework for comparison of available regulatory options, and (3) identify key questions for the CPUC to consider, should it choose to initiate regulatory changes”. Using very limited data and noting a major analytical gap, the report found that for the month of October

2017, Uber and Lyft total VMT amounted to 2% of the total VMT traveled on the California state highway system (approximately 17.22 billion miles). In comparison, ARB has estimated that the state needs to reduce VMT by 7% below projected VMT levels to meet our 2030 climate goals.

In 2018, the California Legislature passed SB 1014 (Skinner), Chapter 369, which established the Clean Miles Standard and Incentive Program with the goal of decreasing GHG emissions from vehicles used by drivers of TNCs and AV operated TNCs. In May of 2021, CARB finalized the Clean Mile Standard that requires TNCs, including AVs, which have an annual VMT greater than 5 million to have 90% of their VMT be zero emission by 2030.

In 2020, Governor Newsom announced Executive Order (EO) N-79-20, establishing the goal that 100% of in-state sales of new passenger cars and trucks will be zero-emission by 2035. Since that announcement, the United States largest auto manufacturer announced that it will only produce ZEVs by 2035, and it has plans for 30 new EV vehicles by 2025.

Cumulative ZEV sales reached 760,000 in September 2020 and currently account for about 8% of new vehicle sales in California. ZEV sales include battery-electric vehicles (59%), plug-in hybrids (40%), and hydrogen fuel cell electric (1%).

According to the author, “California has set ambitious and necessary climate goals, namely 5 million ZEVs by 2030 and all new passenger vehicles to be ZEVs by 2035. 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 AVs to be ZEVs by 2030.”

The Union for Concerned Scientist, writing in support, argues “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.”

The California Chamber of Commerce has indicated to the committee that they oppose the bill and are seeking amendments to extend the ZEV requirement to 2035 in line with the Governor’s executive order. That executive order also only applies to new models, not existing models. They have also expressed concerns to the committee about the creation of a new definition in the vehicle code for “highly autonomous vehicles.” AVs are defined both in regulation to include levels 3, 4 and 5 A. Creating this new definition in the future could lead to DMV or other state agencies placing restrictions on level 4 and 5 AVs but not level 3 AVs. Level

3 vehicles are capable of completing the complete dynamic driving task of a human driver, but may in limited circumstances require human intervention. Most auto manufacturers do not plan on introducing level 3 vehicles because of safety concerns. Finally, the Chamber of Commerce has expressed concerns about this bill's requirement that AVs receive a certification from CARB in order to operate.

Committee comments: This bill requires model year 2031 and later AVs under 10,000 to be ZEVs by 2030. On one hand, 2030 is consistent with CARB's Clean Mile Standard that AVs operating as TNCs be electric. This bill's requirement would be less stringent than the Clean Mile Standard because it applies to all models, not just 2031 and later models). On the other hand, this bill requires electrification earlier for AVs not covered by the Clean Mile Standard—this would include TNCs with fewer than five million miles traveled, limousines, taxis, delivery vehicles and personal use AVs¹. As noted above, this earlier adoption date may be warranted because of the increased VMT projected for AVs with little pooling and electrification. The Clean Mile Standard sets an earlier ZEV adoption rate from the Governor's EO because TNCs operate differently than personally-owned vehicles and typically have higher VMT and therefore are a greater impact on the environment.

CARB currently certifies vehicles as ZEVs, and DMV has this information for the purposes of imposing the ZEV fee on model year 2020 ZEVs and later. The author may want to consider using the existing definition of ZEVs instead of creating a new definition and certification process for the purposes of implementing this bill.

The Legislature may want to consider if it is appropriate to treat level 3 AVs differently from levels 4 and 5. DMV and the Society of Automotive Engineers consider level 3, 4 and 5 vehicles AVs, not just levels 4 and 5. Level 3 vehicles can 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 automated driving system requests the human driver to do so. In all other circumstances, the human driver performs the driving task. Most AV manufacturers consider level 3 vehicles to potentially be unsafe and have decided not to introduce them to the market.

In October of 2015, Google released a report on its experiences with its driverless technology. In 2012 several Google employees were allowed to use one of Google's vehicles on autonomous mode for the freeway portion of their commute to work. Every employee was warned that the car is in its beginning stage, and they should pay attention 100 percent of the time. Each car was equipped with a video camera inside that would film the passengers.

Despite Google's instructions, videos showed that some drivers completely turned away from the driving seat to do things like search for a cell-phone charger, while others simply relaxed. Engineers call this behavior automation bias.

Google stated in their report: "We saw human nature at work: people trust technology very quickly once they see that it works. As a result, it's difficult for them to dip in and out of the task

¹ It should be noted that researchers at the University of California Institute of Transportation Studies (UC ITS) strongly suggest that all AVs should be pooled and not personally owned, both for environmental and congestion purposes. UC ITS estimates the cost of a pooled AV will be significantly lower in costs to the consumer than owning an AV, or any car, themselves.

of driving when they are encouraged to switch off and relax.” Waymo, Google’s automated vehicle arm, has publicly stated they will not be releasing level 3 vehicles.

Research at Virginia Tech University found similar results. Twelve drivers were given vehicles with adaptive cruise control that handled a car’s steering and breaking and put on a test track. Drivers were provided reading material, food, drinks and entertainment media. A passenger joined them and was watching a DVD during the test drive. 58% of the drivers watched the DVD for some time during the three hour trip. 25% of the drivers enjoyed the free time to get some reading done, increasing their risk of a car crash by 3.4 times. Overall, drivers were estimated to be looking away from the road about 33% of the time during the course of the three-hour trip.

The Legislature may want to consider if imposing restrictions on Levels 4 or 5 AVs while excluding level 3 AVs may result in manufacturers introducing potentially less safe level 3 AVs to avoid the restrictions that may be placed on level 4 and 5 AVs.

Related legislation:

SB 66 (Allen) of 2021 requires the Secretary of the California Transportation Agency (CalSTA) to establish an advisory committee known as the California Council on the Future of Transportation.

SB 570 (Wieckowski) of 2021 amends various motor vehicle safety requirements preempted by federal law to exempt AVs from compliance if they do not operate with a human driver. SB 570 is pending before this committee.

Previous legislation:

SB 1014 (Skinner) Chapter 369, Statutes of 2018, establishes the California Clean Miles Standard and Incentive Program with the goal of decreasing GHG emissions from vehicles used by drivers of TNCs, including AVs.

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

REGISTERED SUPPORT / OPPOSITION:

Support

350 Bay Area Action
American Lung Association in California
California League of Conservation Voters
California State Association of Electrical Workers
Calstart INC.
Clean Air Coalition
Coalition of California Utility Employees
Community Environmental Council
Cruise LLC
Elders Climate Action, Norcal and Social Chapters
Electric Vehicle Charging Association
Environment California
Nuro, INC.

Plug in America
Sierra Club California
Spur
Transform
Union of Concerned Scientists
Zoox, INC.

Oppose

Association for Unmanned Vehicle Systems International
California Chamber of Commerce
Internet Association; the
Los Angeles Business Council
Netchoice
Self-driving Coalition for Safer Streets
Silicon Valley Leadership Group
Technet

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