

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**



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**COMMENTS OF UC DAVIS POLICY INSTITUTE FOR ENERGY,  
ENVIRONMENT, AND THE ECONOMY ON THE COMMISSION'S  
REGULATION OF AUTONOMOUS VEHICLES**

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**1. Summary**

The Commission has a valuable opportunity to beneficially shape the future of transportation. The Commission's actions are key to ensuring that automated vehicles (AVs) in passenger service support state goals for accessibility, equity, and the environment.

In summary, these comments from the UC Davis Policy Institute for Energy, Environment, and the Economy contend that:

- (1) Research shows that automated mobility needs to be pooled and electric to support better transportation outcomes. Aligning efforts of the Commission and CARB will ensure that members of the AV Pilot meet the standards and requirements of the Clean Miles Program and contribute to state climate and environmental goals.
- (2) This regulation will interact with many state goals and if this Commission takes a broader definition of accessibility and mobility they will be able to better align their efforts with equity goals.
- (3) To avoid overlapping or conflicting rules, a reasonable focus is to view much of this Commission's regulation as supporting other state agency roles.
- (4) Data collection that supports policy outcomes will be particularly important, and is a distinct role for this regulation that is not otherwise sufficiently covered.

**2. Comments**

Comments relating to 2.1. How should the Commission incorporate safety goals into its AV regulatory framework?

**Research shows that encourage pooling in AVs is a priority and the Department of Motor Vehicles is best suited to lead in protecting public safety.**

An extensive body of UC Davis research points to pooling as a promising strategy for addressing the glut of single occupant vehicle travel in California. Pooled travel has the promise of reducing congestion and emissions, as well as providing more affordable

travel options. Researchers observe that the most significant emissions benefits occur when AVs are operated in a shared and electrified fleet.<sup>1</sup> The Commission can support pooling while supporting broader state safety efforts by clarifying a regulatory framework for AV-for-hire services. The Commission can support state safety goals by prioritizing continuous improvement in AV safety through strategic collection of data—data that support evaluation by state agencies, local governments, and other institutions working in the public interest.<sup>2</sup>

The Department of Motor Vehicles (DMV) already oversees vehicle and driving safety (e.g., reducing collision frequency and severity), including for AVs. The DMV issues permits for AV manufacturers to operate AVs after manufacturers provide proof that the AV(s) in question have been tested in conditions that simulate the actual environment (i.e., the Operational Design Domain) (§ 227.18(b)). AV manufacturers are also required to provide the DMV with a report of AV-involved collisions within 10 business days of the incident.

When it comes to AVs, the Commission can complement DMV safety efforts by establishing regulations and collecting data related to vehicle interoperability and service equity.

The Commission has previously raised concerns that pooling could create in-vehicle safety and security risks for passengers.<sup>3</sup> (Also see Comments Related to 6.2, page 14.) We agree that users of shared AVs, much like users of human-driven vehicles today, will take on a constellation of risks to both their safety and their security.<sup>4</sup> As stated in comments submitted on January 21, 2020, we believe that responsibility for addressing these risks falls on AV manufacturers, AV operators, and TNCs. Such responsibility is out of the Commission’s scope.

But the Commission *can* establish principles for safe and secure pooled AV service that help the U.S. Department of Transportation (U.S. DOT) and the DMV work with the private sector to innovate solutions. For instance, the Commission could recommend investigation into design features that may increase safety for passengers sharing a

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<sup>1</sup> Lewis Fulton, Jacob Mason, & Dominique Meroux, *Three Revolutions in Urban Transportation*, Ins. of Tran. Studies, UC DAVIS (2017), Research Report UCD-ITS-RR-17-03 at 7.

<sup>2</sup> Austin Brown, Greg Rodriguez & Tiffany Hoang, *Federal, State, and Local Governance of Automated Vehicles*. (2018).

<sup>3</sup> D.18-05-043 at 38.

<sup>4</sup> In a recent UC Davis whitepaper, researchers defined safety as “the condition of being secure from accidental harm” and security as “the condition of being safe from intentional harm.” (Kenneth S. Kurani, *User Perceptions of Safety and Security: A Framework for a Transition to Electric- Shared-Automated Vehicles*, Ins. of Trans. Studies, UC DAVIS (2019).

vehicle. Early research findings from UC Davis suggest that safety-enhancing design features could include:

“...large windows to afford a high degree of visibility into and out of the vehicle, spacious seating and legroom (relative to larger shared vehicles like buses, trains, and planes), access to a remote human administrator who can observe inside the vehicle at all times, easy means to program private stops that are nearby one’s ultimate origins and destinations (to maintain privacy), and options for large groups or associations to “own” a particular vehicle (e.g., a female only [shared autonomous vehicle]).”<sup>5</sup>

Comments relating to 2.2. How should the Commission define accessibility?

**A broader definition of accessibility is necessary to align accessibility and mobility goals with equity goals.**

Accessibility should be defined as “the number of desired outcomes that an individual can access within a certain time or distance from the point of origin.” Broadly defining “accessibility” ensures that outcomes are equitable for all individuals and communities—including those with financial constraints, physical and mental disabilities, and many other types of limitations.

According to UC Davis Professor Susan Handy, “accessibility” refers to “cumulative-opportunities measures”.<sup>6</sup> For example, “job accessibility” reflects the number of jobs an individual can access “within a certain time or distance of the origin point”. Whereas, “mobility” refers to the act of moving in space or being mobile. Policies to increase mobility will generally increase accessibility as well by making it easier to reach destinations. Accessibility—not simply mobility—is what is important. The Commission should use the terms “accessibility” and “mobility” carefully to ensure that policies are focused on achieving accessibility outcomes rather than simply moving people around.

It is possible to have good accessibility with limited mobility. For example, policymakers seeking to improve health outcomes for community members may strive to increase accessibility to health care. One way to do this would be by using AV shuttles to

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<sup>5</sup> Sanguinetti, Angela, Ken Kurani, & Beth Ferguson, *Is It Ok to Get Into a Car With a Stranger? Risks and Benefits of Ride-Pooling in Shared Autonomous Vehicles*, Ins. of Trans. Studies, UC DAVIS (2019), <https://escholarship.org/uc/item/1cb6n6r9>.

<sup>6</sup> Susan Handy, *Accessibility- Vs. Mobility-enhancing Strategies For Addressing Automobile Dependence In The U.S.* (2002), [http://www.des.ucdavis.edu/faculty/handy/ECMT\\_report.pdf](http://www.des.ucdavis.edu/faculty/handy/ECMT_report.pdf).

chauffeur doctors to homes in underserved areas—i.e., increasing healthcare accessibility for the community without addressing individual mobility. Another way would be to provide on-demand AV shuttles for underserved areas so that community members can travel to doctor's appointments further from their homes—i.e., increasing accessibility by increasing mobility. While both strategies achieve the same outcome when it comes to increasing healthcare accessibility, the latter approach might on the face be seen as preferable, because it may also increase other types of accessibility (e.g., accessibility to jobs, recreational opportunities, affordable housing, etc.). But for example, some individuals with physical or mental disabilities might prefer home visits to increased on-demand transit options, while other individuals with the same disabilities might prefer the shuttle strategy. It is important for policymakers to engage community members to gauge needs and preferences on an ongoing basis. The importance of community engagement is well documented in the literature. Listening to community members will be central to enabling the successful integration of AVs into our transportation networks.<sup>7 8</sup>

These simplified examples are meant to convey that achieving equitable accessibility policy requires robust community engagement, as well as a complex understanding of the interplay between the terms “accessibility” and “mobility”. Again, policies are most effective when they are designed to successfully achieve accessibility outcomes for community members rather than to simply create options for moving people around.<sup>9</sup> The Commission should therefore broadly define “accessibility” to ensure that outcomes are equitable for communities—including individuals with financial constraints, physical and mental disabilities, and other types of limitations.

#### Comments relating to

- 2.3. Should the Commission clarify that accessibility applies to many demographics, including but not limited to people who are blind or low-vision; are

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<sup>7</sup> Ben Russack, *Advantaging Communities: Co-Benefits and Community Engagement in the Greenhouse Gas Reduction Fund*, UCLA Institute for Research on Labor and Employment (2015), <https://escholarship.org/uc/item/4bt5s9qd>.

<sup>8</sup> Id.

<sup>9</sup> Stuart Cohen & Sahar Shirazi, *Can We Advance Social Equity with Shared, Autonomous and Electric Vehicles?*, UC Davis 3 Revolutions Policy Initiative (2016), [https://www.transformca.org/sites/default/files/3R.Equity.Indesign.Final\\_.pdf](https://www.transformca.org/sites/default/files/3R.Equity.Indesign.Final_.pdf).

hearing impaired; rely on comfort animals; use wheelchairs or have other physical limitations; or, are elderly?

- 2.5. How should the Commission incorporate accessibility goals into its AV regulatory framework?
- 2.6. For the sake of the AV Regulatory Framework, should the Commission define and evaluate accessible service in a manner similar to the process established in Proceeding Rulemaking 19-02-012?<sup>10</sup>

**A broad understanding of accessibility will yield the best overall outcomes for all Californians. Pooled travel in AVs will increase accessibility while reducing vehicle miles traveled.**

The AV Pilot will likely be most effective as an iterative, community-based effort built on a strong commitment to reducing possible known externalities (such as emissions and traffic congestion) while increasing mobility and accessibility for all (including those with mobility challenges).

Encouraging pooled, electric AVs is a good starting place for improving overall accessibility. But ensuring “accessibility for individuals with mobility challenges” will require engagement beyond requiring that AV fleets include wheelchair-accessible vehicles. Ultimately, increasing accessibility will involve addressing barriers for all “people who are blind or low-vision; are hearing impaired; rely on comfort animals; use wheelchairs or have other physical limitations; or, are elderly”. Increasing accessibility will also involve addressing racial, linguistic, spatial, and economic barriers.

The starting place for the Commission is to work with state, regional and local stakeholders, as well as universities, to meaningfully address these barriers by listening to community members to understand their experiences and preferences. This strategy is the best way to avoid assumptions that can undermine the varied and complex needs of California’s diverse communities.

Comments relating to 2.7. Should the Commission incorporate equity and environmental-justice related goals into its AV regulatory framework? If so, how?

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<sup>10</sup> R.19-02-012 (established the Transportation Network Companies (TNC) Access For All Program, which focuses on providing wheelchair-accessible TNC service that is comparable to broad market TNC access. In D.19-06-033, the Commission considers the services comparable if the average wait time for a wheelchair-accessible vehicle to arrive is no slower than the 80th percentile wait time for the broad market program).

**Research suggests multiple steps the Commission can and should take to ensure that AVs benefit all Californians—especially those living in disadvantaged communities or those who have historically been subject to environmental injustice. The most important things the Commission can do are collecting data and engage the community.**

For more than half a century our transportation system has largely focused on moving cars, in part to support increasingly sprawling land uses. Over-reliance on vehicles has come at a high expense to personal budgets, public health and the environment. Private vehicle access can be predictive of job accessibility, and can impact education and health outcomes, as well as effecting other opportunities. Pollution from vehicles leads to asthma and a host of diseases that fall hardest on communities of color.<sup>11</sup>

As shared mobility and autonomous vehicles (AVs) reshape our transportation system, they offer a critical chance to redress these inequities. Without smart policy and planning, however, AVs may instead widen the access and inequality gap. We are focusing here on presenting research-based solutions to the commission to show how AVs might benefit the following disadvantaged communities:

1. Low-income communities
2. Mobility-challenged people, including people with disabilities, seniors and youth
3. Other historically disadvantaged communities, including people of color, immigrant communities (including those with language barriers) and rural communities

Some early trends already raise equity concerns associated with app-based passenger-service, such as much longer wait times and cancellation rates for transportation network companies (TNCs) like Uber and Lyft in people-of-color communities, especially for black men.<sup>12</sup> Also, there have been examples of public agencies cutting bus lines and replacing them with subsidized TNC service, this should require a careful equity analysis of how these services will impact low-income riders.

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<sup>11</sup> Prasad A, Kano M, Dagg KA, et al. *Prioritizing action on health inequities in cities: An evaluation of Urban Health Equity Assessment and Response Tool (Urban HEART) in 15 cities from Asia and Africa*. Soc. Sci. Med. (2015), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5357782/>.

<sup>12</sup> Gillian White, *Uber and Lyft Are Failing Black Riders*, The Atlantic, 2015, <https://www.theatlantic.com/business/archive/2016/10/uber-lyft-and-the-false-promise-of-fair-rides/506000/>

## *Equity*

Inequity in transportation comprises multiple factors. UC Berkeley’s Susan Shaheen suggests that transportation equity can be evaluated based on spatial, temporal, economic, physiological, and social factors. Disparities in one or more of these factors contributes to what UC Los Angeles Researcher Anne Brown refers to as the “mobility haves and have-nots”. The most vulnerable of the “mobility have-nots” typically (1) are reliant on transit and taxis, or other cash based transportation options and (2) have inadequate access to transit, taxi, or other services due to spatial, physiological, or economic barriers also. For these individuals, Dr. Brown surmises that “The three revolutions [of transportation]—vehicle electrification, shared mobility, and vehicle automation—offer both the *promise* of expanding mobility and accessibility (the dream scenario) and the *peril* of exacerbating inequities (the nightmare scenario).”

The key areas of concern include affordability and access as well as neighborhood and geographic distribution. The commission can include equity within its regulation of AVs by ensuring that diverse populations are able to access AV passenger services.

AVs promise to improve auto-mobility for residents in lower-income communities.<sup>13</sup> Black men hailing a TNC are 3x more likely to have their ride cancelled.<sup>14</sup> AVs have the potential to lessen discrimination in transportation as there will not be a driver present.<sup>15</sup> But like TNCs, there could be barriers for use among various disadvantaged populations, especially where there is lower smartphone, data plan, or banking access.<sup>16</sup>

The potential peril of AVs in passenger service hinges on the possibility that service cost or availability will leave some people out. AV service will likely need to begin where demand is densest, which could result in inequitable transportation outcomes for those living in less dense areas. For example, a UC Davis survey shows that early adopters of TNC service were younger, more educated, and more affluent than the general population . Because access to data on TNCs has been limited to date, it is difficult to know the

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<sup>13</sup> Anne Elizabeth Brown, *Ridehail Revolution: Ridehail Travel and Equity in Los Angeles*, UCLA Institute for Transportation Studies (2018), <https://luskin.ucla.edu/from-its-new-research-on-lyft-uber-and-taxis-in-l-a>.

<sup>14</sup> Yanbo Ge et al., *Racial and Gender Discrimination in Transportation Network Companies*, The National Bureau of Economic Research (2016), [https://www.nber.org/papers/w22776?utm\\_campaign=ntw&utm\\_medium=email&utm\\_source=ntw](https://www.nber.org/papers/w22776?utm_campaign=ntw&utm_medium=email&utm_source=ntw).

<sup>15</sup> *Id.*

<sup>16</sup> Brown, *supra* note 13.



Similar issues will likely arise with AV services if there is a lack of available data to assess impacts to communities and address big questions about how AV service will compliment or compete with public transit. On one hand, if AV services are cheap enough, widespread enough, and accommodating enough to adequately serve those who currently rely on transit, this will be a victory for AV service equitability. However, this scenario may erode public transit in some areas. Future transit service operations may require significant changes in service provision to compete with AV service (or become partially or fully automated themselves) to address gaps in service accessibility. This commission should be aware of these complex impacts, and ensure that the data collection from AV pilot allows communities to evaluate the equity impacts of AV services on transit service prior to full deployment. This will allow communities time to prepare mitigation strategies as externalities emerge.

### *Rural areas*

Rural areas present unique transportation challenges. Demand is not as high nor as localized as in urban areas, and so they were not the initial target market for TNCs or AVs, thus there is an urban/rural divide in TNC usage.<sup>17</sup> The Commission could support equity in rural communities by (1) identifying mobility gaps and determining service needs, (2) by gathering input from community groups and representatives, (3) and communicating with leadership from community partners.<sup>18</sup>

Outreach is essential. According to North Dakota State's Ranjit Prasad, "...it is essential for both public and private partners to conduct marketing and outreach activities. Goals of these activities should be to: 1) inform rural residents and potential riders about upcoming [*sic*] services and local partnerships to increase awareness, 2) rebrand already-existing transit/transportation services if there are service changes, 3) attract potential riders, and 4) hire contract drivers."<sup>19</sup>

### *Environmental Justice*

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<sup>17</sup> <https://www.pewresearch.org/fact-tank/2019/01/04/more-americans-are-using-ride-hailing-apps/>

<sup>18</sup> <http://onlinepubs.trb.org/onlinepubs/nchrp/2065/Task76Report.pdf> at 59.

Opportunities for State DOTs (and others) to Encourage Shared-Use Mobility Practices in Rural Areas

<sup>19</sup> <http://onlinepubs.trb.org/onlinepubs/nchrp/2065/Task76Report.pdf> at 72.

According to a UC Davis policy brief, “Disadvantaged communities often suffer the worst impacts of our current transportation system, from higher levels of air pollution to greater numbers of injuries and deaths from car crashes.” These disparities point towards the need for state actors to commit to environmental justice. The U.S. Environmental Protection Agency defines environmental justice in the following manner.

“[Environmental justice is] the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. [Environmental justice] will be achieved when everyone enjoys:

- the same degree of protection from environmental and health hazards, and
- equal access to the decision-making process to have a healthy environment in which to live, learn, and work.”<sup>20</sup>

Central to implementing policy in the spirit of environmental justice is taking time to listen to affected community members and advocates to understand experiences and define “fair treatment”. The Commission should consider joining the state’s Environmental Justice Task Force and strive to incorporate insights from the Task Force into AV policy processes.

To best guarantee significant and lasting benefits to disadvantaged people and overburdened places, the UCLA Labor Center makes the following recommendations:

- Maximize economic, environmental and public health benefits by emphasizing the generation of quality employment opportunities;
- Incentivize anti-displacement methods and leverage local inclusionary housing ordinances;
- Ensure authentic community engagement by prioritizing decisions made in collaboration with grassroots community-based organizations (CBOs) or others involved in a participatory development process.<sup>21</sup>

Comments relating to 2.8. Should the Commission incorporate goals related to city operations and planning into its AV regulatory framework? If so, how?

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<sup>20</sup> <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>

<sup>21</sup> Opportunities for State DOTs (and others) to Encourage Shared-Use Mobility Practices in Rural Areas, <http://onlinepubs.trb.org/onlinepubs/nchrp/2065/Task76Report.pdf>

**The Commission can demonstrate leadership by engaging California’s diverse cities and establishing best practices for the AV pilot to support city operations and planning. This support could include data collection (or analyses) as well as supporting SB 375 planning goals for reducing vehicle miles traveled.**

Each California city has a distinctive socioeconomic and cultural landscape. Each city hosts a diverse set of operations and confronts a unique slate of challenges every day. Keeping cities running smoothly requires local officials to make decisions on a daily, hourly, and even minute-by-minute basis. Though cities also conduct long-range planning activities, the Commission and many state agencies generally have significantly longer decision-making time horizons than those enjoyed by city workers. It can create friction if Commission activities interfere with the capacity of individual cities to tailor actions to local needs and respond to obstacles and opportunities quickly and flexibly.

But the Commission can consider establishing a clear framework to ensure that AV-related data is collected and analyzed in a way that helps local officials make informed short-term planning and operational decisions. The Commission can also work through the Sustainable Community Strategy (SCS) development process (and other planning and funding processes) to convey consistent goals and priorities to cities and counties.

An excellent example of a guiding but not overly prescriptive policy document is the [Automated Vehicle Principles for Healthy and Sustainable Communities](#). Development of this document was led by the Governor’s Office of Planning and Research with participation from multiple state agencies (including the Commission, though not as a core participant). The group included agency staff from CalEPA, CalSTA, Caltrans, CARB, CDPH, CEC, DGS, DMV, Go-Biz, and SGC. The document identifies the following principles for deploying AVs in alignment with the public interest and established state environmental and community goals:

- (1) *Shared-use*: Maximize deployment of shared-use vehicles as an alternative to personal car ownership.
- (2) *Pooled*: Maximize ride-sharing by encouraging pooling, prioritizing pooled vehicles’ mobility, and providing for shared-vehicle passenger safety and comfort.
- (3) *Low-emissions*: Maximize deployment of AVs as low-emission vehicles in the near term and zero-emission vehicles in the long term, and employ eco-driving strategies.
- (4) *Right-sized*: Promote use of vehicles that are sufficiently sized, but not oversized, for the trip purpose.

- (5) *Part of an efficient multimodal system:* Deploy AVs as part of a multimodal system that transports people and goods to destinations quickly and efficiently and, taken as a whole, that is energy-efficient, space-efficient, environmentally benign, and beneficial to human health.
- (6) *Particularly:* Strengthen high-quality transit service rather than duplicating it. Deploy AVs to transport people to transit stations rather than duplicating transit routes.

These principles should serve as a guide for all cities in California and this Commission when it comes to crafting AV policy. The Commission can redouble collaboration with other state agencies and external stakeholders to develop flexible AV policy frameworks that guide but do not constrain city-level planners and operators.

Comments relating to 2.9. Should the Commission evaluate AVs' impacts on congestion, traffic, curb use, and public transit? Why?

**This Commission is best suited to focus on data collection and supporting state goals for sustainable transportation.**

The most important role of the Commission when it comes to AVs is to ensure adequate data collection allows stakeholders to evaluate impacts and implement responses in a timely manner. Improved data would enable researchers and decision-makers to better characterize the effects of AVs on public transit, job accessibility, and health outcomes. Improved data would also enable critical equity analyses to ensure that AVs benefit all Californians.

It is important for the Commission to consider their data collection and evaluation strategy as complimentary to other efforts. Traffic congestion is already well studied by CalTrans and by various city, county, and regional agencies, (often in partnership with universities) so many of these entities may not need evaluation assistance, but they may benefit from additional raw data on the activities of AV pilot vehicles and riders. Cities are well-positioned to monitor curb use, but most will require additional data access to accomplish this goal. Some cities will also require significant technical assistance to conduct evaluation, while others have analytical capacity in-house. Public-transit agencies, counties, and regions that fund, plan, and deliver public transit are well-positioned to evaluate the impacts of external factors (such as AV deployment) on individual transit systems, but much like cities they need access to additional data

sources, and they have varying levels of analytic capabilities.

As such, if the Commission considers undertaking studies of traffic congestion, curb use, and/or public transit, the collaboration of other governments and agencies (as well as universities) will ensure the success of these efforts. As mentioned in 2.7, future transit service operations may require significant changes in service provision to compete with AV service (or become partially or fully automated themselves) in order to address gaps in service accessibility. These strategies may require experimentation and iteration to identify effective strategies and bring them to scale. It will be critical to the success of transit innovators that there is a clear timeline and framework for advancing the AV pilot to full deployment. This will ensure the efforts to pilot transit solutions can compliment the AV pilot to address gaps in community accessibility.

### *Sustainable Community Strategy*

The SCS planning process is one place that could benefit from Commission involvement. SB 375 requires Metropolitan Planning Organizations (MPOs) to develop an SCS for meeting regional GHG targets as a part of their regional transportation plans (and requires an alternative planning strategy in the event that goals aren't met). The SCS must identify transportation policies and programs that will help the region in question to meet GHG emission-reduction goals as the region grows.<sup>22</sup> AVs have the potential to help or hinder progress towards meeting these goals in MPOs. The Commission could make recommendations or develop guidance for how data (or analyses) collected from the AV pilot could feed into SCS planning.

Comments relating to 2.11. Should the Commission establish fleet-level emissions requirements for AV companies that are coordinated with requirements established by Senate Bill (SB) 1014 (the Clean Miles Standard)?

**Aligning the Commission's and CARB's efforts will ensure that members of the AV pilot meet standards and requirements of the Clean Miles Program and contribute to state climate and environmental goals.**

As mentioned in our comments submitted on January 21, 2020, CARB is currently implementing PUC §5450 (passed under SB 1014). CARB determined that the baseline GHG emissions per-passenger-mile for TNCs is approximately 301 gCO<sub>2</sub>/PMT. By

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<sup>22</sup> The Basics of SB 375, Institute for Local Government, <https://www.ca-ilg.org/post/basics-sb-375> (last visited Jan 30, 2020).

2021, CARB will announce targets for companies to reduce emissions from the baseline beginning in 2023. This emission-reduction mandate “applies to transportation providers regulated by the commission that provide pre-arranged transportation services for compensation using an online-enabled application or platform to connect passengers, including autonomous vehicles, charter-party carriers, and new modes of ridesharing technology that may arise through innovation and subsequent regulation.” Therefore, if the AV fleet service open for discussion under this rulemaking can be provided “for compensation”, then the requirements of SB 1014 will likely be applicable to AV fleet services.

Moreover, the legislature has directed the Commission to advance widespread transportation electrification in several parts of the Public Utilities Code.<sup>23</sup> SB 350 (the Clean Energy and Pollution Reduction Act of 2015) increased a 2030 GHG reduction target, the state’s renewable energy requirement to 50 percent, mandates a doubling of energy efficiency, and requires the state to increase travel efficiency. The legislature aimed to achieve these goals in part by directing the Commission to create policies that encourage IOUs and other institutions under the Commission’s purview to transition to electric vehicles, renewable energy, and battery storage. This proceeding must be aligned with the legislature’s overall intent, expressed in other California agencies’ mandates, and other Commission proceedings.<sup>24</sup> The Commission should align with these goals by advancing transportation electrification within proceedings related to AVs.

#### Comments relating to

- 2.10. How should the Commission incorporate goals related to environmental and climate impacts into its AV regulatory framework?
- 2.12. & 2.12.1. Should the Commission incorporate goals from key climate, transportation, and equity-related legislation into its AV regulatory framework? If so, how? Which laws and programs should the Commission reference? Please comment specifically on SB 32, Assembly Bill (AB) 32, SB 350, SB 1014, SB 1376, and SB 375.

**Encouraging shared and electric AVs is an effective strategy for achieving many state goals, including reducing emissions, reducing vehicle miles, reducing traffic congestion, and encouraging more accessible and more equitable transportation**

<sup>23</sup> Public Utilities Code § 740.12

<sup>24</sup> SB 350, SB 1014 (Legislature’s intent); SB 1014 (CARB’s mandate); A.18-01-012, D.18-01-024, D.18-05-040, D.18-09-034, (Transportation Electrification Proceedings).

## options.

As mentioned in our comments submitted on January 21, 2020, allowing fares and shared rides in AVs will be critical to ensuring that AVs are sustainable and affordable. Creating a regulatory environment that incentivizes electrification and pooling of AVs will help in meeting state environmental goals. The Commission can support these goals by partnering with relevant regulatory agencies and by collecting data to assess whether AVs are helping meet policy goals.

The Commission has done significant work to support the goals of SB 32, which requires GHG emission reductions of 40% below 1990 levels by 2030, and should continue to leverage their efforts towards achieving climate goals. There are a number of ways that encouraging shared and electric AVs would further support SB 32 goals as well as the following climate policies:

- *SB 350*: The Commission has already worked to identify barriers for low-income communities to adopt ZEV and near-ZEV transportation options, and to recommend ways to overcome these barriers. Encouraging sharing and electrification of AVs would further increase access to affordable, sustainable vehicles in low-income communities.<sup>25</sup>
- *SB 375*: Encouraging shared rides in AVs will help reduce overall VMT and help communities meet their VMT reduction goals. The Commission can also support the goals of SB 375 by ensuring robust efforts to collect valuable data on the AV Pilot (e.g., data on the travel behavior of AV passengers, data on the volume and occupancy of trips) and making these data accessible so that communities have the information they need to prepare for the transition of AVs from pilot to full deployment.<sup>26</sup> Data (or analyses) can be provided to MPOs to aid SCS development.<sup>27</sup>
- *SB 743*: Good data collection can also support this bill, by ensuring that adequate information is available for assessing transportation impacts on development projects. Data can also inform new metrics for evaluation of development impacts, such as Vehicle Miles Traveled (VMT) per capita, VMT per employee, and net

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<sup>25</sup> California Energy Commission, Clean Energy and Pollution Reduction Act - SB 350 California Energy Commission, <https://www.energy.ca.gov/rules-and-regulations/energy-suppliers-reporting/clean-energy-and-pollution-reduction-act-sb-350> (last visited Jan 29, 2020).

<sup>26</sup> The Basics of SB 375, Institute for Local Government, <https://www.ca-ilg.org/post/basics-sb-375> (last visited Jan 30, 2020).

<sup>27</sup> The Basics of SB 375, Institute for Local Government, <https://www.ca-ilg.org/post/basics-sb-375> (last visited Jan 30, 2020).

VMT (instead of levels of service or traffic volumes).

The following pieces of climate legislation are also relevant to the Commission's proceedings regarding the AV Pilot:

- *AB 398*: Revenues from California's cap-and-trade program are deposited in the Greenhouse Gas Reduction Fund (GGRF). A portion of GGRF funds support adoption of low and zero-carbon transportation alternatives and as of 2018 have yielded more than 40,000 rebates for low and zero-emission vehicles.<sup>28,29</sup>
- *AB 1493*: Requires CARB to adopt regulations to reduce GHGs from vehicles, including by establishing a baseline for and monitoring emissions.
- *SB 2127*: Requires the Commission to work with the State Energy Resources Conservation and Development Commission (Energy Commission) and CARB to prepare and update an assessment on charging infrastructure needed to support the state's goal of putting 5 million EVs on the roads by 2030. This bill would require the Energy Commission to consult with and seek data regarding EV infrastructure from stakeholders. The Commission can ensure that infrastructure needs that can enable EV AV fleets are considered in this assessment.

Finally, SB 1376 tasks the Commission with establishing a program for ensuring TNC accessibility for persons with disabilities. The Commission imposed a 10-cent fee on TNC trips that supports wheelchair-accessible vehicles (WAVs) for on-demand transportation and bolsters the TNC Access for All Fund. The Commission could consider ways for the AV Pilot to further align with and complement SB 1376.<sup>30</sup>

Comments relating to 3.1. In a new regulatory category, what information should the Commission require to be reported by a person or entity authorized to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle to the Commission; how often (e.g. monthly, annually, per trip, etc.) should this information have to be reported to the Commission; and under what conditions, if any, should this information be made available to the public?

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<sup>28</sup> <http://www.caclimateinvestments.ca.gov/about-cci>

<sup>29</sup> <https://www.c2es.org/site/assets/uploads/2017/09/summary-californias-extension-its-cap-trade-program.pdf>

<sup>30</sup> TNC: Accessibility for Persons with Disabilities Program (SB 1376, Hill), California Public Utilities Commission, <https://www.cpuc.ca.gov/tncaccess/> (last visited Jan 29, 2020).



**Requiring AV fleet companies to report data will enable the commission to monitor progress towards equity, accessibility, air quality, and congestion goals. The frequency of data reporting required will depend on the type of data requested. Data made available to the public should be aggregated and a third-party is best suited to hold any disaggregated data securely.**

The goal of the data collection effort is to monitor progress towards state and local policy goals, and the Commission is best suited to conduct this effort in cooperation with other agencies, governments and/or academic groups. The Commission may be best suited to lead on establishing enforcement actions if regulations requiring adequate equity, accessibility, and air quality are not being met. However, collaboration with other state agencies will ensure that this enforcement effort is not duplicitous. Data should only be made available to the public in an aggregated form that can protect the privacy and proprietary interests at stake. Information that could be used to identify individual riders should not be included in any publically available dataset.

Comments relating to 5.1. Should the Commission designate a new regulatory category, such as Autonomous Vehicle Carrier, to authorize a person or entity to provide prearranged passenger transportation service using AVs operated without a driver in the vehicle?

**Narrow roles will avoid creation of too many nested unique designations.**

Research suggests that an effective AV framework would define narrow roles, such as AV manufacturer, asset owner, fleet operator, ride broker. Each role designation would then be subject to unique reporting requirements. If a company plays multiple roles, they should be subject to multiple reporting requirements.<sup>31</sup>

For example, if a company currently operates as a company that brokers rides between riders and independent drivers (operating like a Transportation Network Company (TNC)) but it also chooses to operate and own AV assets (operating like a transportation charter party-carrier (TCP)), then it would remain a TNC for the ride-brokerage element of its efforts. It would simply honor the obligations for both a TNC and a vehicle operator (rather than entirely converting its operation to TCP). If an AV manufacturer develops,

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<sup>31</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/AV-Governance\\_IssuePaper\\_1218.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/AV-Governance_IssuePaper_1218.pdf)

operates, and brokers rides, it would have all three of these designations and would have three separate reporting requirements.

Comments relating to 3.2. How should the information be made available to interested government entities? For example, should such information be hosted by a third-party entity (e.g. university, research institution, etc.)?

**A third party is likely best suited to store AV-pilot and TNC data.**

As mentioned in our comments submitted on December 17, 2019, oversharing and undersharing mobility data are both problematic. Stakeholders need to find a middle-ground approach. A third party such as the University of California Institute of Transportation Studies (UC ITS) is properly suited to store TNC data.<sup>32</sup> As the research arm of the state, academic institutions are well situated to maintain a balance between the need for data to remain confidential and the need for data to be utilized in pursuit of critical policy research.

The UC has extensive data-storage experience. The University of California system has several existing data repositories. UC Irvine has a machine-learning repository that currently maintains close to 500 datasets through a searchable interface. UC Davis hosts extensive trip and vehicle data from electric vehicles. The UC Merritt is a repository service from the University of California Curation Center (C3) that lets the UC community manage, archive, and share its digital content. The UC system would likely be able to create or use an existing data repository with adequate usability, features, and formats for secure storage of AV Pilot data.

The U.S. Department of Transportation's Secure Data Commons (USDOT SDC) is an exemplary model of how to create a third-party platform for storing and analyzing sensitive data. The USDOT SDC engages two main types of users: data providers and data analysts. Data providers voluntarily add data however they deem appropriate. Providers can contribute data in real time, schedule regular batch uploads of historic data, or upload data on an occasional, ad-hoc basis. The USDOT SDC grants different levels of access to different types of data analysts based on criteria defined by data providers. Providers also set parameters for whether datasets (or data analyses conducted on the SDC platform) can be exported.

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<sup>32</sup> UCD ITS' ability to store data will be subject to mutually acceptable contract terms and approval of those contract terms by applicable university authorities.

Data analysts must file an application and sign a data-sharing agreement to be granted access to the SDC. If approved, analysts will have access to a set of datasets tailored specifically to the level of access they are granted, as well as to statistical tools such as R, Python, and SQL. The SDC only includes two current mobility programs (each with several datasets): the Waze Connected Citizens Program (CCP) and the Connected Vehicle Pilot Deployment Program (CVPDP).

Comments relating to 4.1. How should the Commission define what constitutes an “autonomous vehicle” used in prearranged passenger transportation service for-hire?

**The term “automated” is preferred to the term “autonomous”.**

The term “automated” is more inclusive than “autonomous”. “Automated” includes all vehicles with automated driving features, including partially automated vehicles, fully automated vehicles in which a human driver can still assume control, or driverless vehicles. The term “autonomous” refers exclusively to vehicles in the Level 5 SAE designation: i.e., vehicles that can drive anywhere in all conditions and that do not allow manual override.<sup>33</sup>

Comments relating to 6.2. Should the Commission impose any requirements to ensure the safety of all passengers on the chartering by more than one party (i.e. fare-splitting) of AVs operated without a driver in the vehicle?

**Pooling is an essential part of the sustainable transportation future and the Commission’s I is likely best suited to focus on**

As mentioned in our comments submitted on January 21, 2020, encouraging shared (“pooled”) rides among AV chartering parties is the most important change needed to the existing Pilot Test Program for Autonomous Vehicle Passenger Service. An extensive body of research points to pooling as a promising strategy for reducing single-occupant vehicle travel. Pooled travel can reduce congestion and emissions while making travel more affordable.

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<sup>33</sup> Updated visual chart for SAE International’s “Levels of Driving Automation” Standard for Self-Driving Vehicles, SAE Int’l (2018) <https://www.sae.org/news/press-room/2018/12/sae-international-releases-updated-visual-chart-for-its-“levels-of-driving-automation”-standard-for-self-driving-vehicles>.

To reiterate from above (page 2): The Commission has previously raised concerns that pooling could create in-vehicle safety and security risks for passengers.<sup>34</sup> We agree that users of shared AVs, much like users of human-driven vehicles today, will take on a constellation of risks to both their safety and their security.<sup>35</sup> As stated in comments submitted on January 21, 2020, we believe that responsibility for addressing these risks falls on AV manufacturers, AV operators, and TNCs. Such responsibility is likely out of the Commission's scope.

#### Comments relating to

- 8.1. What amount of insurance coverage (i.e. evidence of ability to respond to judgments for personal injury, death, or property damage) should the Commission require of a person or entity to provide prearranged passenger transportation service using AVs?
- 8.1.1. Should the Commission establish insurance requirements independently from the insurance coverage required for a Department of Motor Vehicles AV deployment permit? R & T

#### **The Commission might consider relative risk, rate flexibility, equity, and safety incentives when developing insurance coverage for AVs.**

The Policy Institute has six publications on insurance coverage for AVs.<sup>36</sup> These papers conclude that a new regulatory scheme should be created for AV insurance coverage, as Prop 103 (which specifies insurance coverage requirements for personal vehicles) is not well suited for AVs. Policy Institute analysts identified four parties who could potentially be liable in an AV accident: (1) manufacturers, (2) vehicle operators, (3) fleet owners, and (4) TNCs. Each of those groups should be required to have insurance. Manufacturers could be liable under tort theories of products liability, absolute (strict) liability, or

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<sup>34</sup> D.18-05-043 at 38.

<sup>35</sup> In a recent UC Davis whitepaper, researchers defined safety as “the condition of being secure from accidental harm” and security as “the condition of being safe from intentional harm.” (Kenneth S. Kurani, *User Perceptions of Safety and Security: A Framework for a Transition to Electric- Shared-Automated Vehicles*, INS. OF TRANS. STUDIES, UC, DAVIS (2019).

<sup>36</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability\\_PolicyBrief\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability_PolicyBrief_010819.pdf);  
<https://policyinstitute.ucdavis.edu/wp-content/uploads/Insuring-Automated-Vehicles.pdf>;  
[https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt1\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt1_IssuePaper_010819.pdf);  
[https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt2\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt2_IssuePaper_010819.pdf);  
[https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt3\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt3_IssuePaper_010819.pdf);  
[https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt4\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt4_IssuePaper_010819.pdf).

negligence.<sup>37</sup> Vehicle operators could be liable under tort theories of negligence, strict liability, or respondeat superior.<sup>38</sup> Fleet owners' liability will be determined by the "Graves Amendment". Fleet owners could be liable under tort theories of vicarious liability, negligent maintenance, or negligence entrustment.<sup>39</sup> Finally, TNCs could be liable under the tort theories of vicarious liability and the nondelegable duty doctrine, negligent supervision, or negligent hiring or retention.<sup>40</sup>

Ultimately, the liability burden that TNCs and AV dispatchers face is unclear. A two-tiered insurance system is likely (HAV owner insurance and TNC insurance—similar to how current requirements mandate that the TNC as well as its contractors to carry insurance). TNCs and AV dispatchers will insure in proportion to risks HAVs pose.<sup>41</sup>

In order to get a permit to operate an AV, the DMV currently requires evidence of insurance for damages of up to five million dollars, a surety bond for up to five million dollars, or a certificate of self-insurance for up to five million dollars.<sup>42</sup> This evidence of ability to respond to judgements for personal injury, death, or property damage is to ensure victims are able to be compensated.

If the Commission decides to develop additional insurance coverage requirements for AV operators beyond the DMV's requirements, the Policy Institute's aforementioned policy could provide some guidance.<sup>43</sup> Specifically, these papers recommend that insurance policies for AVs consider the following factors:

- *Relative risk.* If AV insurance rates are based on AV operator traits rather than vehicle traits, insurance rates won't accurately reflect AV risk.
- *Flexibility.* Rating factors require flexibility since risk will constantly be changing. Insurers should be able to self-determine the most efficient rating practices and should be able to change rates quickly. The process provided by Prop 103 for changing insurance rates is too time-consuming for rapidly evolving AVs.
- *Equity.* For example, the good driver discount (GDD) that exists for human-driven vehicles poses concerns for AVs since all AV operators would quickly become eligible. Hence the wealthy—who are more likely to be able to afford an AV—would be nearly universally eligible for GDD while those driving conventional

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<sup>37</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt1\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt1_IssuePaper_010819.pdf).

<sup>38</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt2\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt2_IssuePaper_010819.pdf).

<sup>39</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt3\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt3_IssuePaper_010819.pdf).

<sup>40</sup> [https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt4\\_IssuePaper\\_010819.pdf](https://policyinstitute.ucdavis.edu/wp-content/uploads/Liability-Pt4_IssuePaper_010819.pdf).

<sup>41</sup> Issue Paper 4, *Id.*

<sup>42</sup> California Code of Regulations (CCR) §§ 227.04, 227.12.

<sup>43</sup> *Supra* note 25.

vehicles would not.

- *Safety*. AV operators, manufacturers, owners, and dispatchers should all have some “skin in the game” for AV crashes in order to incentivize improved safety.<sup>44</sup>

## **Conclusion**

We look forward to working on the many important and complex issues that will be addressed in proceedings related to the AV Pilot and to providing further detail or research synopses.

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Respectfully submitted,

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<sup>44</sup> <https://policyinstitute.ucdavis.edu/wp-content/uploads/Insuring-Automated-Vehicles.pdf>.