Waymo LLC
1600 Amphitheatre Pkwy
Mountain View, CA

November 5, 2021

Liane M. Randolph, Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Advanced Clean Cars II

Dear Chair Randolph:

Waymo's mission is to make it safe and easy for people and things to get where they're going. As Waymo works to deliver the potentially transformative safety benefits of fully autonomous technology, we also see a unique opportunity for shared fleets of autonomously driven vehicles to expand access to zero emission transportation.

Waymo is headquartered in California and we value the opportunity to work alongside the California Air Resources Board (CARB) to improve air quality in our home state. CARB has made significant progress in advancing the manufacturing of zero-emission vehicles and advancing clean transportation under the Advanced Clean Cars (ACC) I program. Waymo's comments express our support for the goals of ACC II and offer additional suggestions for CARB's consideration toward our shared goal of connecting more Californians to the many benefits of zero-emission transportation.

I. Waymo supports CARB's goal of expanding access and customer adoption of electric vehicle transportation.

As previously submitted in Waymo's August 2021 comment letter regarding the Advanced Clean Cars II Regulation, Waymo supports CARB's goal of expanding access and customer adoption of electric vehicle transportation.

To date, Waymo operates the only public fully autonomous commercial ride hailing service in the world in the metro Phoenix area. We're excited to share that we started providing zero-emission autonomous trips to some members of the public in our all-electric Jaguar I-PACE vehicles in San Francisco in August 2021. On September 30, 2021, the California Department of Motor Vehicles issued Waymo an autonomous vehicle deployment permit, approving the use of Waymo autonomous vehicles for commercial services offered to the California public.[1]

[1] California DMV Press Release (retrieved: 10/22/21) https://www.dmv.ca.gov/portal/news-and-media/117199-2/

II. Shared mobility can accelerate ZEV access and generate more community benefits.

By the time ACC II regulations begin in 2026, we believe that shared mobility and autonomously driven electric vehicles will meaningfully contribute to achieving CARB's goals. We recommend that CARB develop an ACC scoring framework and electric vehicle trip incentives that prioritize shared EVs and reward zero emissions mileage, thereby increasing ZEV accessibility to more Californians. As stated in our previously submitted comments, below we compare the holistic community benefits between personally-driven EVs with shared EVs.

Community Benefits	(1) Reduces Local Air Pollution	(2) Aligns with Local Parking & Transit-Oriented Development	(3) Zero Emissions Miles Delivered per Vehicle per Year	(4) More accessible to low income, renters, aging & disadvantaged populations	(5) Renewable Content of Energy	(6) Requires public or multifamily charging infrastructure	(7) Battery Warranty, Reliability & Range Anxiety
Personally-Driven EVs	🟢	🔴	~12K	🔴	California RPS: 2030 - 60% 2040 - 100%	🔴	🔴
Shared EVs	🟢	🟢	Up to 50K	🟢	100% Renewable under LCFS	🟢	🟢

(1) While all EVs reduce tailpipe emissions, not all EVs are equally-accessible or provide the same air quality, economic, and community benefits. For example, the average transaction price of an EV in June 2021 was $49,766, which is out of reach for many Californians.[2]

(2) Lower parking demand for personally-driven vehicles can be repurposed to provide substantial opportunities for redevelopment of existing parking areas within cities, helping boost housing density, increase transit viability, provide additional green space or space for micromobility options, and increase property value and tax revenue.[3]

(3) Shared EVs have higher utilization and can deliver four times the zero emission mileage than personally-driven vehicles, thereby serving more California households with fewer cars.[4]

(4) Hailing an autonomous EV can improve mobility access for many Californians who can't drive or afford to purchase an EV.

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[2]Average New-Vehicle Prices Hit All-Time High, According to Kelley Blue Book (retrieved 10/26/21) https://mediaroom.kbb.com/2021-08-17-Automobile-Prices-Hit-All-Time-High-in-July-2021-Purchase-Incentives-Continue-to-Drop

[3]Anne Vernez Moudon et al., "Effects of Site Design on Pedestrian Travel in Mixed-Use, Medium-Density Environments," Transportation Research Record 1578, no. 1 (January 1, 1997): 48–55, https://doi.org/10.3141/1578-07; B. E. Saelens, J. F. Sallis, and L. D. Frank, "Environmental Correlates of Walking and Cycling: Findings from the Transportation, Urban Design, and Planning Literatures," Annals of Behavioral Medicine 25, no. 2 (Spr 2003): 80–91; Donald Shoup, ed., Parking and the City (Routledge, 2018).

[4]World Economic Forum. Electric taxis and urban fleets can speed decarbonisation - Here's how (Retrieved 8/27/21) https://www.weforum.org/agenda/2021/05/how-urban-fleets-in-madrid-paris-and-lisbon-will-speed-decarbonisation/

(5) Higher renewable energy content for commercial EV charging infrastructure is supported through CARB's Low Carbon Fuel Standard program. Waymo's California chargers are powered by 100% renewable energy.

(6) Waymo's autonomous EVs are not reliant on public charging infrastructure.

(7) Lastly, consumers will feel more confident about taking EV trips as compared to purchasing an EV, in the sense that they will not have to overcome battery warranty, reliability, or battery range anxiety concerns since that is the responsibility of the commercial transportation service provider.

III. Zero Emission Vehicles that are placed into service for shared mobility services should be awarded a higher number of ZEV credits.

Waymo "upfits" EVs with the Waymo Driver — a combination of hardware sensors and software — to enable shared mobility services. Shared fleets of autonomous EVs represent an opportunity to more rapidly expand ZEV access and scale these benefits broadly for more Californians through ride hailing services.

Research has shown that low income neighborhoods and communities of color have seen a significant improvement in transportation access from ride hailing.[5] One study from UCLA found that users living in low-income areas made more trips per person, compared to middle- and high-income communities, and that TNC drivers service 99.8 percent of the population of L.A. county. While ride hailing may be a supplemental convenience for higher-income riders, it can be a lifeline for those without a car, and lower car ownership is correlated with lower income communities.

To that end, Waymo recommends that ACC II score EVs placed into shared mobility service with a higher number of ZEV credits than personally-driven EVs. The additional ZEV credits should be awarded to the transportation service provider who chooses to "upfit" EVs with shared mobility technology. This ZEV scoring model would reflect that, when compared to personally-driven EVs, a shared EV mobility model creates more environmental and community benefits, and improves access to EVs. In order to qualify for the additional ZEV credits, transportation service providers would operate a fleet of shared EVs that would be hailable to the public in a ZEV state.

IV. By aligning EV incentives through a trip and shared fleet framework, CARB can generate the maximum clean air and economic benefits for more Californians in disadvantaged communities.

The CARB presentation on August 11th highlighted the SB 350 Barriers Report, which states that *"In making vehicle purchase decisions, clean vehicles are not yet viewed as affordable, reliable or as convenient as gas counterparts. Residents lack awareness of clean vehicles and have anxieties and fears of newer technologies, resulting in a reluctance to purchase advanced technology clean vehicles."*[6] The

[5]Brown, A. E. (2018). Ridehail Revolution: Ridehail Travel and Equity in Los Angeles. UCLA. ProQuest ID: Brown_ucla_0031D_16839. Merritt ID: ark:/13030/m5d847t1. (Retrieved 10/25/21 - https://escholarship.org/uc/item/4r22m57k)

[6] Low-Income Barriers Study, Part B: Overcoming Barriers to Clean Transportation Access for Low-Income Residents (CARB, 2018). (Retrieved 10/25/21 - https://ww2.arb.ca.gov/sites/default/files/2018-08/sb350_final_guidance_document_022118.pdf)

reluctance of Californians to adopt ZEVs could be significantly reduced if it were simplified and reframed to paying for a trip in a ZEV, ameliorating some anxieties associated with EV charging and ownership.

Research with low-income East Oakland residents from the transportation advocacy group TransForm found that while the majority of interviewees were interested in a hybrid or electric vehicle because it would save on fuel and maintenance costs compared to a gasoline vehicle, they did not think that existing tax credits were an attractive purchase incentive. All car owners in the sample had purchased used cars and could not afford the upfront costs of a new vehicle or did not want to take out a car loan. TransForm found that for low-income and rent burdened populations, tax credits for new vehicles may not be helpful.[7] Our EV trip incentive proposal addresses this by providing broader access to the benefits of EVs through an EV-as-a-Service model.

For Californians living in single-family homes, EV charging is more convenient, easier to install, and more economical. The CARB presentation on October 13th stated: *"over time, more people living in apartments will buy ZEVs, where it is harder to find home charging*", and that charging is more expensive for those who cannot charge at home. Recognizing these economic and convenience challenges of EV ownership for some Californians, EV trip incentives represent an innovative equity strategy to increase access to EVs for more Californians — including renters, aging populations, low-income households, and disadvantaged communities — and should be prioritized over incentives for personally-driven EVs when possible.

A ZEV trip incentive framework can use public data to maximize the impact of the State's ZEV investments for the pick-up or drop-off location of each trip. It provides the option to geographically weight trip incentives for communities that would benefit most from improved access to zero emission vehicles. For example, the State could provide an increased ZEV incentive for trips that start or end in disadvantaged communities as identified by CalEnviroScreen. The State may also choose to increase ZEV trip incentives in areas with a higher percentage of renters, areas more impacted by air pollution, or provide additional incentives during "Spare-the-Air" days.

EV trip incentives could be facilitated through platforms similar to the Low Carbon Fuel Standard, whereby zero emission transportation providers could request incentives on a customer's behalf. Program guidelines, targets, and rules could be easily managed through an API or spreadsheet to reduce administrative costs and ensure maximum benefit for the State's investment in zero emission mobility.

V. Conclusion

Cleaner mobility is a goal that Waymo and CARB share. We provide these comments in the spirit of collaboration to advance clean mobility solutions for more Californians.

[7] Pan, A., & Shaheen, S. (2021). Strategies to Overcome Transportation Barriers for Rent Burdened Oakland Residents. *UC Berkeley: Transportation Sustainability Research Center*. http://dx.doi.org/10.7922/G237771N. (Retrieved 10/25/21 - https://escholarship.org/uc/item/327773q9)

Respectfully submitted,

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