



May 31, 2022

Chair Liane Randolph and Members of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: Advanced Clean Cars 2, Auto Innovators Comments

Dear Chair Randolph and Members of the Board,

The Alliance for Automotive Innovation (Auto Innovators)¹ appreciates the opportunity to provide comments on the California Air Resources Board's (CARB's) Advanced Clean Cars II (ACC II) regulatory proposals.² These are, without question, the most sweeping and transformative regulations in the history of the automobile industry. They set an incredibly challenging framework for fundamentally changing personal transportation in the United States for the next century. Auto Innovators and its members are committed to this vision and share the ambition of California to converge upon a future mobility system of zero-emission vehicles.

Auto Innovators appreciates the transparent and open dialogue that staff provided during the development of the ACC II proposals. The insight provided through workshops and listening sessions was enormously helpful in aligning and focusing the efforts of our members to provide constructive feedback throughout the process. Staff provided timely and fair responses to many of our proposals that have helped inform a robust and comprehensive suite of proposals. Our members will continue to engage with staff and help usher this process through to completion and the adoption by other Section 177 states.

¹ The Alliance for Automotive Innovation members include vehicle manufacturers (BMW Group, Ferrari, Ford, GM, Honda, Hyundai, Isuzu, Jaguar Land-Rover, Kia, Mazda, Mercedes-Benz, Mitsubishi Motors, Nissan, Porsche, Stellantis, Subaru, Suzuki, Toyota, Volkswagen, and Volvo), original equipment suppliers, technology companies, and other automotive-related companies and trade associations. The Alliance for Automotive Innovation is headquartered in Washington, DC, with offices in Detroit, MI and Sacramento, CA. For more information, visit our website <http://www.autosinnovate.org>.

² "CARB's regulatory proposals" include the documents contained in the Public Hearing Notice and Related Material posted on April 12, 2022, at <https://ww2.arb.ca.gov/rulemaking/2022/advanced-clean-cars-ii>.

All-In Approach for the Success of Electrification

The auto industry is committed to electrification and a net-zero carbon transportation future. Electric vehicles (EVs)³ and the myriad of components that make up the vehicles is a technology that continues to rapidly evolve and mature. Many of the components and technologies within an EV are at the very heart of the new and highly competitive innovation economy. Our members have the technical know-how and engineering expertise to bring great vehicles to market. However, for much of the technology in electrified vehicles, we are still in the early process of building the raw material and manufacturing baseload capacity to bring high volumes of these vehicles to market. These are nascent supply chains that are just now beginning to build momentum for global scale. Our members are investing unprecedented levels of resources into the human and manufacturing capacity needed to manifest an electrified future.

Vehicles are not silos; rather, they exist within a transportation ecosystem that includes fueling infrastructure, service stations, dealers, supply chains, and other important businesses that support the function and reliability of the car. To that end, the success of ACC II and the transformation to an electrified future will not just be determined by the ability of our members to bring great vehicles to market but will equally be determined by the ability of other stakeholders to bring to market robust and reliable infrastructure, supply chains, and services. Many of these functions are beyond the control of our members, which is why we have been consistent and resolute in our message that the success of electric vehicles will truly require an “all-hands on deck” approach—an all-of-government, all-of-industry approach from all stakeholders in every relevant mobility field.

An integrated and comprehensive commitment will be needed to ensure that customers receive an exceptional ownership experience with their electric car. We are confident that with concurrent and durable commitments by all stakeholders, the future of electrified transportation will be successful in California, the United States, and all over the globe.

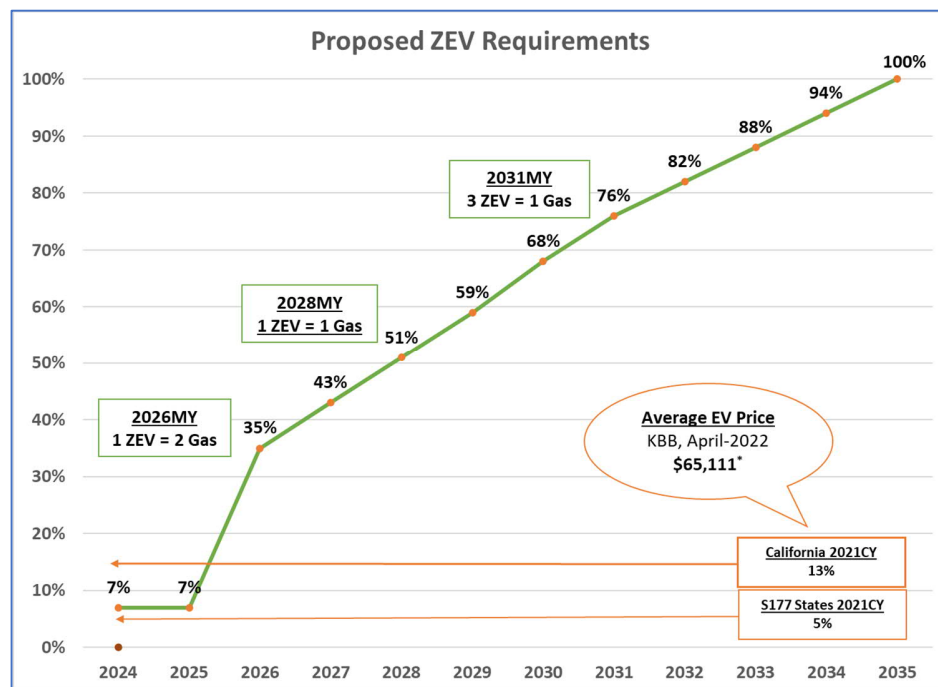
Make no mistake that at its core our success will depend on delivering to customers a better transportation experience than what they have today. This requires great automobiles supported by ubiquitous, reliable charging and professional service support that will keep Californians on the road and moving about their daily lives. We must collectively be successful in not just meeting but exceeding the needs and expectations of our customers.

This letter provides our broad outline on electrification, and what is needed to achieve our shared goal of wide-scale EV ownership and use. Additionally, we provide more detailed comments on battery durability in Attachment A, zero emission vehicle (ZEV) related regulations in Attachment B, and criteria emission related proposals in Attachment C.

³ For the purposes of this letter, EVs include battery, plug-in hybrid, and fuel cell electric vehicles (BEV, PHEV, and FCEVs, respectively) unless otherwise noted.

Summary and Significant Issues

As shown below, the draft ACC II regulations require very aggressive increases in EV sales. In California, EV sales must triple in about three model years. Most of the states following California must see a seven-fold increase in EV sales in that period. On the surface, these are staggering increases in a new technology.



*See Kelly Blue Book, <https://mediaroom.kbb.com/2022-05-10-Luxury-Share-Increases-in-April,-Pushing-New-Vehicle-Average-Transaction-Prices-Higher,-according-to-Kelley-Blue-Book>

However, the required increases are based on 2021 EV sales where the average transaction price of EVs was about \$60,000.⁴ This suggests that average EV buyers are far more likely to be affluent single-family homeowners with modern electric panels just a few feet from their garage where they will charge their EVs. These buyers do not represent a cross-section of California new car buyers, and achieving 30, 50, or 70 percent of the new car market will require reaching buyers of more moderate means, and it will require action well beyond automakers' ability to produce more EVs.

Automakers will work to meet the standards CARB ultimately adopts, but the proposed requirements will be *extremely challenging* even in California. These standards may not be achievable in all the states that currently follow California's program.

⁴ The most recent Kelly Blue Book report, April 11, 2022, <https://mediaroom.kbb.com/2022-04-11-New-Vehicle-Transaction-Prices-Drop-for-Third-Straight-Month,-but-Remain-Above-MSRP-in-March,-according-to-Kelley-Blue-Book> retrieved May 7, 2022.

Beyond the stringency of CARB's proposed regulations, we highlight the following substantial issues that should be addressed either by the Board or in the Staff's Proposed 15-Day Changes.

1. [ZEV Assurance Measures and Battery Durability](#)

ACC II includes a variety of requirements, referred to as ZEV Assurance Measures, that are related to increasing transparency and protecting the interests of consumers who purchase new electrified vehicles. Auto Innovators recognizes that the intention of these proposals is not to protect against emission increases from ZEVs (as they have no emissions), but rather to prevent consumers from switching back to combustion vehicles or otherwise not adopting ZEVs at the rate projected by ACC II. We support the overwhelming majority of changes that protect and provide transparency to EV owners and buyers. For example, we support new regulations that include a battery warranty to protect consumers from defective EV batteries, require service information for independent repair shops and owners, and data standardization that includes a new customer-facing state of health (SOH) battery monitor to ensure used vehicle buyers can make informed decisions.

However, the draft ACC II regulations also include a troubling new battery durability requirement. While we do not oppose durability requirements as a general matter, as we recognize the importance of increasing the overall durability of traction batteries, we do oppose the requirements in the Initial Statement of Reasons (ISOR) because they fail to align with globally developed standards. Moreover, the durability requirement could increase the cost of EVs by forcing manufacturers to include additional battery pack capacity that would not be available to the new vehicle buyer.

Instead of the standards proposed, automakers support adoption of the United Nations Global Technical Requirements (UN GTR) durability requirements. These very challenging requirements were developed over a multi-year process by the global community that included regulatory agencies and automakers from around the world. In fact, the Committee was chaired by U.S. EPA. The current version of the GTR is just the beginning, as all parties recognize that even more demanding requirements could be implemented in the future once the technical committee has more field data and experience to help inform the next standard.

The draft ACC II EV battery durability requirement differs from the international UN GTR. If CARB were to adopt a requirement that is out of step with the GTR, it would proliferate a patchwork of regulations for a technology that is seeking global scale and commonality. This would drive up complexity and could slow the development of EVs. The durability policy objective can be achieved by adoption of the UN GTR and this approach will support the development of international standards.

A single global durability standard for vehicles that produce no emissions in their life allows automakers to develop and implement global platforms that reduce costs and improve quality compared to a patchwork of requirements around the world. A patchwork, which would start with these California regulations, will not reduce emissions but will *substantially*

increase costs and reduce accessibility of EVs for many Californians. Auto Innovators requests CARB to be aligned with the UN GTR and to maintain their active role in looking to future versions of the GTR for additional, long-term durability gains which will be informed by field data and analysis.

Again, we agree with measures that protect consumers or provide more transparency, but the durability requirements proposed in the ISOR goes well beyond those requirements and will negatively impact the industry and the EV market.

2. Flexibilities and streamlining

Auto Innovators and our members propose several changes that either provide greater flexibility or streamline the requirements while maintaining the spirit of the regulations to ensure the 100 percent requirement in 2035. For example, we suggest:

- a. Allow medium-duty vehicle EVs to be used to meet the ACC II Requirements: Currently, both the light-duty vehicle (LDV) ZEV regulations in 13 CCR §1962.2 and the medium-duty vehicle (MDV) ZEV regulations in 13 CCR §1963.2 allow the transfer of MDV ZEV credits to meet the LDV requirements. This makes sense conceptually, since electrifying a large MDV provides *more environmental benefit* on a per-vehicle basis (GHG and criteria).

Unfortunately, the proposed regulations in §1962.4 do not allow this. Adding this provision could result in more MDV ZEVs both in California and the states that have adopted Advanced Clean Trucks (ACT) and those states that have not adopted ACT. We recommend revising the ZEV regulations in §1962.4 to allow excess MDV ZEV credits to be used to meet the LDV ZEV requirements.

This provision is most valuable and will encourage the greatest volume of MDVs if it allows the transfer of MDV ZEV credits but does not require those ZEVs to also meet the LDV ZEV mandate. Thus, the manufacturer would have to meet the MDV ZEV Mandate under Advanced Clean Trucks (ACT), and any excess credits beyond those required to meet ACT could be transferred to the LDV ZEV program under §1962.4. If instead, MDVs are treated as if they are LDVs, it eliminates most of the incentives to over-comply in the MDV space. For example, in 2035, there would be no incentive to over-comply with the MDV ZEV regulations because the LDV ZEV regulation requires 100% ZEV, so there would be no benefit to transferring a MDV ZEV.

- b. Eliminate shortfall requirement: We recommend eliminating the requirement that converted or “historical” ZEV values can only be used if there is a shortfall. By allowing manufacturers to use converted credits to meet 15 percent of their requirement in a state, any credits beyond the Annual ZEV Requirement could then be pooled. This change would make the pooling provision, which sunsets after 2030, a useful tool. Otherwise, as proposed, a manufacturer with converted credits must over-achieve the minimum compliance requirement to generate any pool credits.

- c. Allow averaged (or cumulative) converted credit cap: Many CARB regulations place a multi-year average cap on the use of a regulatory provision. For example, if the average cap is 15 percent, then a manufacturer could use 10 percent in year one and 20 percent in year two such that the average is 15 percent. We recommend using an average cap for converted credits that are currently capped at 15 percent each year. This would allow a manufacturer to use less converted credits one year (10%) and more the next (20%). ACC II should allow this flexibility over the entire period of converted credit usage (2026-2030MY). This has no impact on the total number of ZEVs produced and delivered for sale in the 2026-30 time-period but provides manufacturers considerable flexibility.

3. Environmental Justice (EJ) Values

Automakers are interested in the proposed EJ provisions but recommend the items below to maximize the use and benefit of the equity provisions in ACC II. These recommendations allow additional innovative programs, expand the program over a longer period, and temporarily increase the benefit for low MSRP vehicles to encourage manufacturers to bring more affordable EVs sooner.

- a. New Section to Encourage Innovative Programs: We recommend adding a new section that would allow manufacturers to propose, and the Executive Officer to approve, innovative clean mobility programs designed to increase EVs in equity communities. For example, this provision could allow infrastructure investments in equity communities, which the current regulations do not appear to allow. Other ideas to improve access to and use of EVs in equity communities might include EVs in community car-share or ride-share programs. Or offering vehicle bundles (new or used) that include vehicle, insurance, and fuel. In addition to encouraging new and innovative programs in California, this would also allow the same in states that follow California under Section 177 of the Clean Air Act. We recognize that States' processes related to adoption of new regulatory language may preclude the ability of CARB to propose "open ended" language that would provide Executive Office authority, so we are open to further dialogue about processes that could otherwise provide fast-track approval of new ideas. Our goal is to ensure that new, creative ideas can be proposed and approved to further EV adoption.
- b. Warranty Provision: We recommend the ACC II regulations provide an additional EJ values for EVs placed in the Qualifying Community-based Clean Mobility Programs that include an extended traction battery warranty for 10 years or 150,000 miles at 70 percent through 2030 model year and 75 percent for 2031 model year.
- c. Allow Early Implementation: Allow implementation starting in 2023MY for off-lease vehicles since these vehicles will start coming off-lease in 2025 or 2026 calendar year. For all other EJ programs allow implementation beginning in 2024MY.

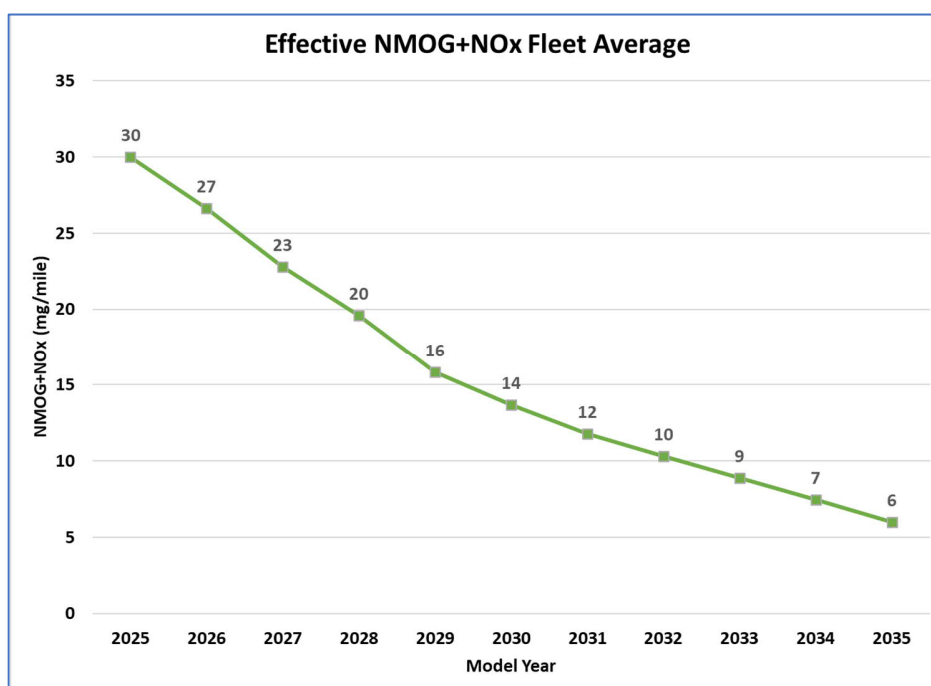
- d. Extend Implementation: Extend all the EJ programs through 2031MY (Community Car share, Low MSRP, Off-lease, and the new section on Innovative Programs).
- e. Extend the use of EJ values: Extend EJ value use through 2034MY. This will ensure the EJ programs can see maximum utilization through the end of implementation.
- f. Low MSRP: To encourage manufacturers to bring more affordable EVs sooner and effectively kickstart the affordable EV market, we recommend providing additional EJ Values during the first few years of the program.

Model Year	Vehicle Value
2024-26	0.3
2027	0.2
2028	0.1

4. Criteria Emission Requirements

As noted above, automakers are committed to net-zero carbon and electrification of the light-duty vehicle fleet. However, this transformation requires massive investment in EV technology. Automakers must primarily focus resources on the transformation rather than incremental changes to existing, very near-zero (criteria) emission internal combustion engine (ICE) vehicles. We have worked with CARB staff over the past two years to develop standards that substantially reduce real-world criteria (NMOG, NO_x, PM), as rapidly as possible without stranding technology or diverting resources from electrification.

As shown below, under the proposed criteria exhaust regulations, the effective criteria emissions fleet average decreases by 80 percent over the course of this regulation as more EVs are introduced. Additionally, most real-world emissions occur during the first 30 to 60 seconds after the engine starts. Known as cold starts, these emissions occur when the catalyst is still cold and not operating at maximum efficiency. The proposed ACC II regulations further control cold starts through three new regulations for intermediate cold-start, quick drive off, and high-powered cold start for some PHEVs.



Background:

Automakers are committed to net-zero carbon and electrification of the vehicle fleet. Today, automakers offer about 70 EV models in every shape and size, from small cars to large cars, economy cars to luxury cars, minivans to SUVs, powered by fuel cells, batteries, and plug-in hybrid powertrains. This represents long-term investment by automakers, yet, we expect further investment to deliver more than 130 models in just the next few years. These vehicles are reliable, safe, efficient, affordable, and fun to drive.

Every automaker has announced broad electrification plans, with many setting aspirational targets of 100% ZEV in the 2035 to 2045 timeframe, assuming appropriate supportive policies. However, make no mistake: this is a dramatic transformation that will impact a vast swath of the U.S. economy – labor, mining, home builders, dealers, suppliers, commercial builders, utilities, the oil industry, battery manufacturers, public and private fleets, hydrogen providers, and most importantly, customers.

Transformation will not come without a comprehensive approach that includes all sectors. The auto industry alone is projected to invest over \$330 billion by 2025.⁵ Of course, the \$330 billion is only a down payment from automakers – it gets automakers to the 2026 ACC II start line, but

⁵ See Alix Partners, *Automakers and Suppliers Need to Adopt 'All-New Ways Of Doing Business' to Master the Conversion to Electric Vehicles, Materials Shortages, the Rise of New Entrants and Other Disruptors such as Autonomy and Connectivity*, says AlixPartners Analysis, June 2021, Retrieved from <https://www.alixpartners.com/media-center/press-releases/2021-alixpartners-global-automotive-outlook/> on September 1, 2021.

it in no way provides compliance to the levels approaching 100% proposed for 2035. Globally, automakers are projected to spend \$515 billion by 2030.⁶

This level of investment requires automakers to focus resources on electrification. For ICE vehicles, which are already very near zero criteria emissions, CARB staff and automakers have worked together to focus new requirements on those primarily achievable without large capital expenses. In this way, we secured substantial reductions in tailpipe-based criteria emissions, without stranding resources and detracting from EV investments.

For EVs, CARB should harmonize with global and federal requirements wherever possible. State-specific requirements add complexity and increase compliance costs without environmental benefit, especially since the end goal is a fleet of zero emission vehicles.

Moreover, automaker investment alone does not ensure success. Far from it – automakers can only provide one part of the investment needed to change the way people have lived, worked, and played for well over 100 years. This transformation will impact the entire personal transportation eco-system that includes trillions of dollars of public and private investment.

For example, there are currently 150,000 gas stations across the U.S.⁷ Are these simply shuttered over the next 10 to 20 years? Or, are they transformed into hydrogen stations and EV fast charge stations? Another example: around 100,000 auto workers are employed at transmission and engine plants. Are those employees laid off and the plants boarded up? Or, are these workers retrained and factories repurposed? These are just two small examples of the many issues that must be addressed to prevent harming workers, small businesses, consumers, and the overall automotive supply chain.

Auto Innovators attempted to identify the necessary elements for substantially increasing the EV market by focusing on four broad areas: infrastructure, costs, production, and customers. If we can address each and all of these, we can see progress and success. However, a narrow focus on only one area (infrastructure, costs, or labor) will only frustrate the market and slow the transformation.

⁶ See Environmental Defense Fund, *Electric Vehicle Market Update, Manufacturer Commitments & Public Policy Initiatives Supporting Electric Mobility in the U.S. & Worldwide*, April 2022, Retrieved from http://blogs.edf.org/climate411/files/2022/04/electric_vehicle_market_report_v6_april2022.pdf?utm_source=newsletter&utm_medium=email&utm_campaign=newsletter_axiosgenerate&stream=top on May 5, 2022.

⁷ Service Station FAQs. API. <https://www.api.org/oil-and-natural-gas/consumer-information/consumer-resources/service-station-faqs#:~:text=How%20many%20service%20stations%20are,stations%20across%20the%20United%20States> retrieved May 16, 2021.

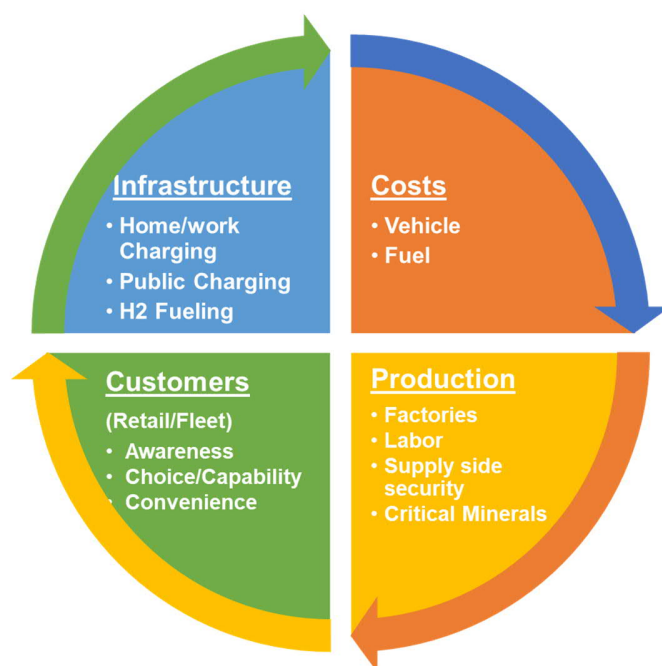


Figure 1: Major Areas of Focus to Expand Electrification across the U.S.

The graphic in Figure 1 shows the major areas of focus to support the EV transformation. We understand that some are beyond the scope and/or authority of CARB (e.g., production), and that ACC II regulates only new vehicles. Nonetheless, ARB should include a robust and thorough inventory and analysis of all areas. We also recommend identifying additional policy areas beyond those described above. Resolution of these issues will determine the success of the vehicle requirements adopted. For example, are there sufficient mines and facilities to produce and process the Cobalt, Lithium, Nickel, Manganese to support 40, 50, 70, or 100 percent electric vehicles, recognizing that California is not alone in their electrification targets and the world must share these resources?

Beyond identifying and analyzing the issues, success requires proper coordination, sequencing, and timing of stakeholder actions to avoid stranding public and private investments or negatively impacting workers, small businesses, and/or consumers (those purchasing/leasing new *and* used vehicles).

In the following pages, we attempt to discuss each of the major areas.

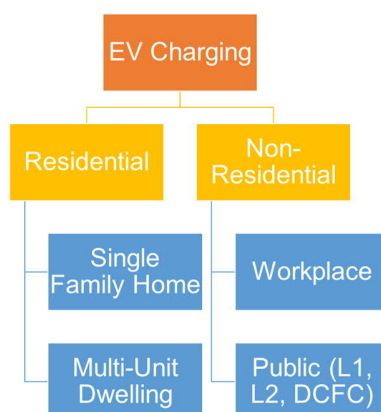
Infrastructure

Mainstream customers will not buy a vehicle that is difficult to fuel. Every new car buyer fully understands the availability of gasoline. In fact, fuel availability is never a consideration for gasoline car buyers. However, EVs fueled by either electricity or hydrogen present a new world for customers. Without ubiquitous, low-cost, convenient, and reliable infrastructure,

mainstream buyers will simply turn away from the new technology in favor of the certainty of gasoline.

1. [EV Charging](#)

EV charging infrastructure falls into a couple of broad categories – residential and non-residential.



a. [Residential Charging](#)

Almost every study conducted by the California Energy Commission (CEC), the national labs, and others on the need for public charging assumes that 80 to 90 percent of charging occurs at home.⁸ In other words, before any consideration of public, workplace, or corridor charging, residential charging must be addressed. Residential charging is essential to reaching the ACC II proposed level of EVs. Consequently, we should simply agree that 100 percent of residential dwelling units with parking need level 2 (L2) charging, and immediately begin the investment – starting with building code changes that codify this requirement for both new construction and significant renovations.

The increasing battery capacities in BEVs suggest that L2 charging should be provided at all residential parking spaces. Increased battery capacities are being driven by several factors. First, it is still not clear whether mass-market consumers will demand a 200-, 300-, or 400-mile range, but vehicle range and thus battery capacities have steadily increased over the past several years, suggesting consumers demand longer-range BEVs akin to gasoline vehicles.

Second, early EVs tended to be smaller, lighter, more aerodynamic passenger cars. However, this does not reflect consumer preferences in the U.S., Section 177 state, or California markets,

⁸ For example, see: (1) Crisostomo, Noel, Wendell Krell, Jeffrey Lu, and Raja Ramesh. January 2021. Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030. California Energy Commission. Publication Number: CEC-600-2021-001. (2) Eric Wood, Clément Rames, Matteo Muratori, Sesha Raghavan, and Marc Melaina, September 2017, National Plug-In Electric Vehicle Infrastructure Analysis, National Renewable Energy Laboratory.

which are weighted toward minivans, pickup trucks, CUVs, and SUVs.⁹ To achieve the driving range now expected by consumers, these vehicles require larger batteries. Thus, BEV battery capacities now approach or exceed 100 kWh, and we expect that trend to continue.

Some suggest that L1 charging is sufficient for residential charging. We disagree. Charging a 100-kWh battery on L1 (1.4 kW) requires almost three full days (about 71 hours). Because a BEV utilizing L1 charging must be plugged in around-the-clock, there is no opportunity to schedule charging to support the grid or for those owners to obtain the most favorable utility rates. California should not expect customers to accept this inconvenience. Thus, all residential parking should provide standard L2 charging. We agree with staff that L2 charging at a minimum of 5.76 kW, as required by the proposed in 13 CCR §1962.3 ZEV Charging regulations, is essential to maintaining reasonable charge time and reducing the risk of customer dissatisfaction.¹⁰

As noted in the ACC II ISOR, “Electric vehicle owners report that slow charging is dramatically less satisfying, and when drivers experience slower-than-normal charging speeds it has a very large overall negative effect.” While we support this on the vehicle, we are concerned that, to reduce costs, installed chargers will not provide this same capability and customers will be dissatisfied. We expect CARB to work with manufacturers and other stakeholders to ensure not only the vehicle, but also the charging network support this charge rate.

Finally, residents of single-family homes and multi-unit dwellings (MUDs) should enjoy identical access to charging. Nonetheless, because of the complexity and cost of installing EV charging at MUDs, some suggest that, while residents in single family homes can charge at home, MUD residents should be forced to charge elsewhere, such as at DC fast charge stations or public chargers. We disagree. Charging at home is far cheaper, more convenient, and more reliable. In fact, the convenience of charging at home is continually touted as one of the benefits of a BEV compared to a gasoline-fueled vehicle. It would be unreasonable to expect MUD residents, who in many cases are lower income, to pay 2 to 3 times as much for charging and spend hours away from home each week just to charge their vehicles. This will lead them away from EVs and is not consistent with either California’s equity or climate change goals.

To summarize, residential charging is essential to developing the EV market and must be quickly and significantly expanded. Building code standard-setting agencies, public utility commissions, and state and federal governments must immediately begin implementing broad electrification infrastructure programs that assure access to safe, reliable, and affordable residential EV charging for all residents, not just those in single-family homes.

⁹ For a breakdown of new vehicle sales in California, see <https://www.autosinnovate.org/resources/insights/ca> under “New Purchases,” which shows 54.3% of new purchases in California minivans, pickups, CUVs, and SUVs.

¹⁰ Standard L2 charging provides about 7 to 10 kW of electricity, which will supply about 20-40 miles of range per hour of charging. 13 CCR 1962.3 requires vehicles be capable of charging at a minimum of 5.76 kW, and that each vehicle is equipped with a convenience cord capable of charging at 5.76 kW.

b. Non-Residential Charging

i. All non-residential

Just like with residential charging, building code standard-setting agencies, public utility commissions, state and federal governments must immediately begin implementing broad electrification infrastructure programs that assure access to EV charging. Note that we are well beyond the point of “pilot programs.” The ACC II regulations are not “pilot programs” and no one should be satisfied with more pilot programs at PUCs, building standard-setting agencies, or federal, state, or local governments where a few chargers are installed to test the waters. The infrastructure is needed on a broad scale, and it is needed now.

ii. Workplace

Workplace charging is second only to residential charging in importance. Like residential charging, workplaces have long dwell times (8-10 hours, typically). Providing charging stations at work extends the range of BEVs for commuting, relieves range anxiety, and maximizes the electric miles driven in PHEVs. Moreover, workplace charging stations increase consumer awareness. The overwhelming majority of EV drivers have a positive experience and happily share this positive experience with co-workers.

As noted above, we recognize that most drivers will get sufficient charge at home if they have home charging. Consequently, unlike residential parking, not every workplace parking spot needs charging. Auto Innovators recommends the installation of L2 EV charging in 20 to 40 percent of employee parking spots. The state should immediately commit to a plan to ensure this level of charging at government workplaces and should also develop a plan to ensure this level of charging at all workplaces by 2035 to support the ACC II regulation being considered.

iii. Public

Public charging includes Level 1 (L1), L2, and direct current fast charging (typically 50-350 kW), allowing public charging to be tailored to the use experience, or dwell times. In addition to relieving perceived “range anxiety,” public charging stations also raise consumer awareness. There are far too many unique situations for specific recommendations, but some areas to consider:

- Highway corridors clearly require high-power DCFC (350kw)¹¹ to allow drivers to quickly recharge on long-distance trips.

¹¹ We recognize that very few current vehicles allow charging at 350 kW. In fact, many do not allow charge rates over 150 kW. However, vehicle charging rates are increasing, and providing for 350 kW helps future-proof charging stations, particularly at key locations noted above. 350 kW provides sufficient power to allow EVs to more closely compete with gasoline or hydrogen fueled vehicles. For example, a 10-minute charge at 350 kw can provide an additional 120 to 200 miles of driving for most current vehicles.

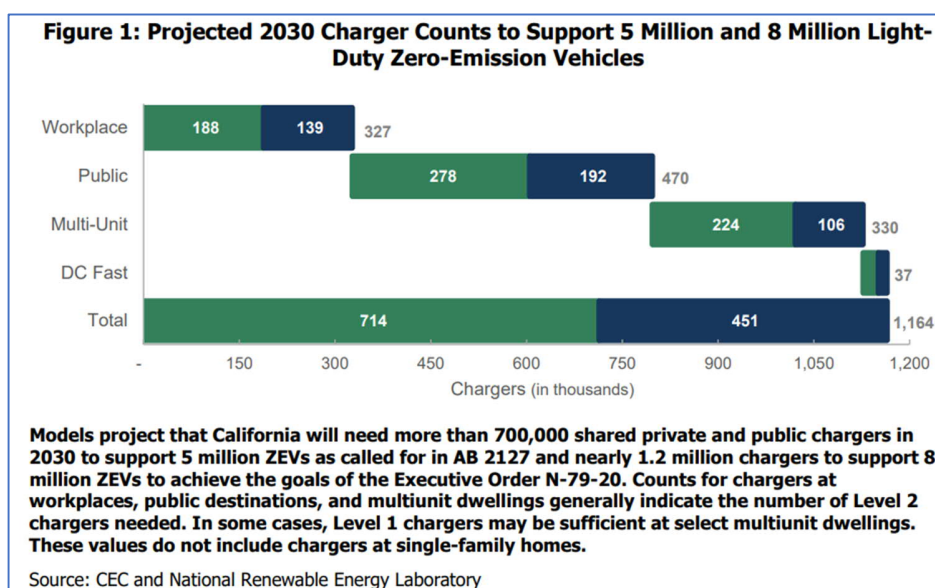
- Likewise, transportation hubs (airports, train stations, etc.) should have high-power DCFC (350kw) for transportation network company (TNC), taxicab, and other rideshare drivers to quickly recharge. This maximizes the environmental benefits since these vehicles are driven more than average vehicles.
- City centers should also have DCFC at appropriate power levels depending on expected dwell time.
- Other public charging will depend on, and should be analyzed for, the expected dwell time and likely distance driven. For example,
 - Airport parking (beyond TNC, taxi and ride-share drivers noted above) will have dwell times measured in days, and drivers that do not typically travel long distances.
 - Amusement parks will have 6- to 12-hour dwell times with long-distance visitors.
 - Professional sports and concert venues will have 2- to 4-hour dwell times from medium-to-long distance visitors.
 - Convenience store or neighborhood grocery store customers have short dwell times and local customers.

A well-thought-out plan that is properly executed is essential to raising consumer awareness and ensuring that public charging is reliable, convenient, and readily available. This plan, and the coinciding development of public charging is absolutely necessary to ensure that driving an EV is as convenient as driving today's gasoline vehicles.

c. EV Charging Summary

We would be remiss not to point out that California has a long way to go to ensure sufficient EV charging. Less than a year ago, the California Energy Commission and National Renewable Energy Laboratory released a report showing that California will need about 1.2 million charging stations at workplace, MUDs, and public locations by 2030 to reach 8 million EVs (see chart below).¹² The report notes that as of January 4, 2021, there were only about 70,000 public and shared private chargers across the state. The report also indicates that a total of 193,000 EV chargers should be available by 2025. This is vastly below what is needed to support the regulatory requirements proposed in ACC II.

¹² Alexander, Matt, Noel Crisostomo, Wendell Krell, Jeffrey Lu, and Raja Ramesh. July 2021. Assembly Bill 2127 Electric Vehicle Charging Infrastructure Assessment: Analyzing Charging Needs to Support Zero-Emission Vehicles in 2030 – Commission Report. California Energy Commission. Publication Number: CEC-600-2021-001-CMR. Retrieved from <https://efiling.energy.ca.gov/getdocument.aspx?tn=238853> on May 9, 2022



2. Hydrogen Fueling

From a customer perspective, hydrogen fueling is nearly identical to gasoline refueling. A FCEV can provide over 400 miles of range on less than 5 minutes of fueling. The issue with hydrogen fueling is the dearth of hydrogen fuel stations. Despite a decade of work by automakers, CARB, the California Energy Commission, and the Governor's office, California currently has only 54 open retail hydrogen stations.¹³ This is far behind the 2020 target of 100 stations and far less than the 200 stations Governor Brown called for by 2025. Even still, California is the only state in the country with any appreciable hydrogen fueling.

Federal, state, and local governments must commit to hydrogen infrastructure - streamlining permitting, installing stations, and providing incentives that allow stations to come online to support vehicle sales. Hydrogen fueling infrastructure requires careful coordination and a synchronized rollout, since automakers cannot sell FCEVs without the stations. This is currently the case in 49 states, and to an extent even in California, where FCEV sales have been restricted due to a lack of hydrogen fueling infrastructure.

Costs

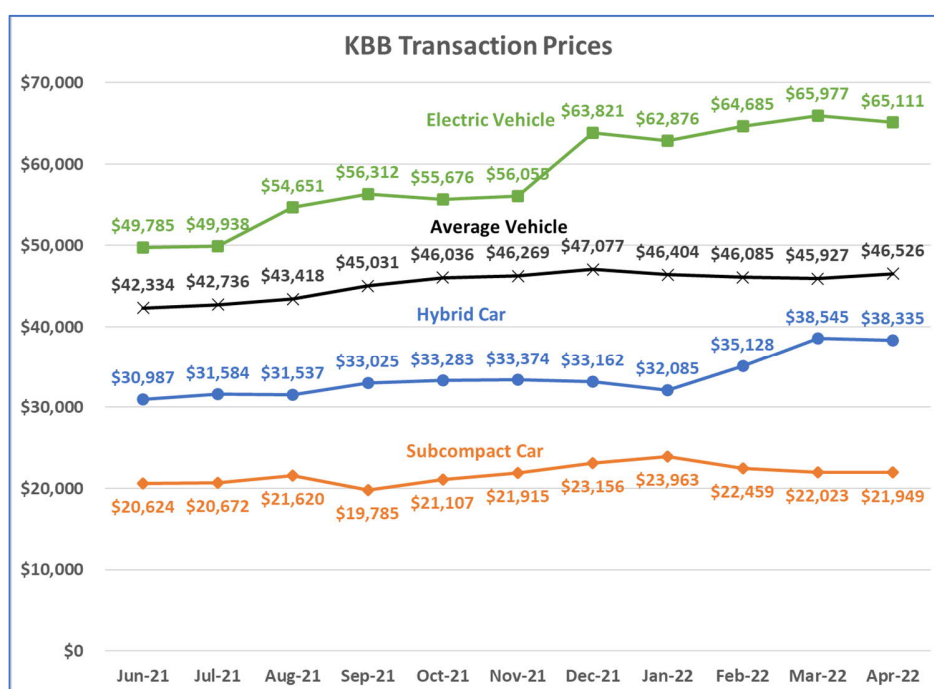
There are several elements to the cost of an EV.

¹³ CA Fuel Cell Partnership, Station List, https://cafcp.org/sites/default/files/h2_station_list.pdf, updated May 2, 2022.

1. Vehicle Costs

Vehicle costs include the battery, fuel cell stack, and/or on-board hydrogen storage. While these costs have come down over the last 10 years, EV costs still exceed the costs of gasoline vehicles with similar attributes. We appreciate CARB staff's comprehensive review of EV costs, including vehicle design and component costs, incremental vehicle costs, and CARB's approach to assign specific costs to vehicle categories and other consumer requirements (e.g., cold-weather, towing, and all-wheel drive). Ongoing work to advance these technologies and continue lowering costs is critical, and we are committed to working with CARB staff to fully develop EV technology cost estimates.

A look at the current data shows that EV transaction prices are far higher than the price of the average gasoline vehicle, and almost three times the price of the most affordable vehicle segment (i.e., "subcompact").



These are nationwide transaction prices that don't necessarily reflect the underlying cost of the technology, and there are certainly lower cost EVs available. However, these prices suggest that average EV buyers are far more likely to be affluent single-family homeowners that do not represent a cross-section of California or the even new car buyers.

Current EV transaction prices are not only higher, prices and costs are increasing rather than decreasing. A host of factors are contributing to the rising EV transaction prices. Some factors are hopefully temporary (e.g., supply chain problems, silicon chip shortages, prices driven by the war in Ukraine). Other cost increases are driven by increasing world-wide demand for EVs and EV components such as batteries, and the very long lead-times needed to source the raw materials and site, permit, and construct mines and processing facilities to produce batteries.

Finally, economy-wide inflation (currently at a 40-year high) is also driving prices for all parts higher.

Customers are seeing these price increases on the vehicles. Tesla raised prices twice in a matter of days in March.¹⁴ Rivian increased its prices by 20 percent on some vehicles.¹⁵ Finally, Lucid CEO reported they are considering price increases on their EVs, which start at \$77,400.¹⁶ Used vehicle prices are also increasing dramatically.

2. Fuel Costs

Mass-market adoption of PHEVs, BEVs, and FCEVs requires simple and low-cost fuel.

For PHEVs and BEVs, this means simple and low-cost electricity rates that a new car salesperson can explain in one sentence. This is not the case today – driving an EV and charging at home in California can cost anywhere from less than \$1 per gallon of gas equivalent to well over \$6 per gallon of gas equivalent when compared to a 40-mpg car. Residential electricity rates are complex, vary dramatically from one utility to the next, vary further by the customer's rate plan, and by the time and day the vehicle is charged. To be sure, most Californians will pay less driving a PHEV or BEV if using a time of day (or time of use) rate and charging their BEV or PHEV at home between midnight and 6 a.m., but the complexity of the rate system is problematic for home charging.

Public charging can be more confusing and more costly. Some charging is free but behind a pay per hour parking gate. Some charging is based on kW, others charge by the hour or portion thereof. Some charging networks have monthly fees and then kW fees. DCFC costs are different (and typically more) than L2 costs. Again, these are not insurmountable obstacles, but they add to customer confusion.

FCEVs and hydrogen fueling are both in their infancy, and the hydrogen fuel prices reflect that fact. A 2021 Joint Agency Report on AB-8¹⁷ found average hydrogen prices were slightly over

¹⁴ Reuters, *Tesla Raises Prices for Second Time in Days on Rising Costs*, retrieved from <https://www.reuters.com/business/autos-transportation/tesla-raises-prices-some-china-made-vehicles-2022-03-15/> on May 5, 2022.

¹⁵ Reuters, *Rivian raises EV prices by 20%, inviting customer ire, taunt from Musk*, retrieved from <https://www.reuters.com/technology/rivian-hikes-vehicle-prices-by-20-citing-inflationary-pressure-2022-03-02/> on May 5, 2022.

¹⁶ Reuters, *Rising Costs have Lucid Ceo Eyeing Price Hike for Future Electric Cars*, retrieved from <https://www.reuters.com/business/autos-transportation/lucid-eyes-price-increases-future-models-will-honor-prices-existing-reservations-2022-03-17/> on May 5, 2022.

¹⁷ Baronas, Jean, Belinda Chen, et al. 2021. Joint Agency Staff Report on Assembly Bill 8: 2021 Annual Assessment of Time and Cost Needed to Attain 100 Hydrogen Refueling Stations in California. California Energy Commission and California Air Resources Board. Publication Number: CEC-600-2021-040. Retrieved from <https://www.energy.ca.gov/sites/default/files/2021-12/CEC-600-2021-040.pdf> on May 5, 2022.

\$16 per kg of hydrogen or about \$6.40 per gallon of gasoline equivalent. To shelter consumers from the high cost of hydrogen, automakers that sell or lease FCEVs provide up to \$15,000 of free fuel. However, this level of subsidy cannot continue indefinitely.

High costs and confusing price structures will hinder if not halt mass market adoption of EV technologies, particularly when consumers might already be skeptical.

3. [Government Research and Development](#)

Federal and state government funding of research and development could potentially accelerate technology improvements and reduce costs of batteries, fuel cell stacks, on-board hydrogen storage tanks, and hydrogen fuel. This work also includes efforts to ensure durability of the technology and continue life-cycle work on vehicle batteries, such as Cal-EPA's Lithium-ion Car Battery Recycling Advisory Group.

Public utility commissions could and should establish rates that ensure driving electric is cheaper than driving a gasoline vehicle.

[Customers](#)

Given the wide range of BEVs, PHEVs and FCEVs that automakers either already offer or plan to offer over the next few years, *the most important barrier to commercialization is consumer acceptance, which cannot be realized without a solid foundation of federal, state, and local government driven complementary support measures: incentives, infrastructure, fuel price reduction and simplification, and consumer awareness.*

While we appreciate the sincere hard work of the Governor's office, the legislature, CARB, and other state agencies over the past decade, the current suite of complementary measures is simply not sufficient or reliable enough. For example, the Clean Vehicle Rebate Project (CVRP) is frequently out of funds, resulting in waiting lists. The requirements for income, range, and MSRP change on a near annual basis, and the amount of rebate also changes. Infrastructure deployment is behind that needed to meet current EV drivers, it must vastly expand to meet the goals of the states or the requirements in this regulation.

Outside of California, the need for market-facing policies is far more pronounced.

Beyond essential complementary measures, the following actions will help to increase consumer awareness of and confidence in EVs.

1. [Automaker Promotion and Advertising](#)

For their part, automakers promote ZEVs through national, regional, and local advertising, Super Bowl advertisements, ride and drive events, dealer training, and customer incentives that reduce the cost of owning and driving a ZEV, and manufacturer/dealer efforts to streamline

home charger installation. These campaigns and advertisements reach tens of millions of consumers.

2. [Consumer Awareness Campaigns](#)

Consumer awareness campaigns such as *Veloz* and *Drive Change. Drive Electric.*, funded by automakers, states, and others, seek to not only raise consumer awareness of and comfort with EV technology, but also provide a collaborative environment to identify and address barriers to EV adoption. While automakers promote their own products, these consumer awareness campaigns focus on promoting brand-neutral EV technology and increasing consumer knowledge of EVs, to leverage the likelihood that a customer chooses an EV for their next car.

Unfortunately, these consumer awareness campaigns have been limited in scope with small budgets. Collaboration among all stakeholders (government, automakers, utilities, charging station providers, NGOs, and others) enhances consumer awareness and education outreach efforts. The state should consider a consumer education program like the Flex Your Power Campaign (Flex Your Power received \$50 million annually in 2001 and 2002, and over \$11 million in 2003) to increase customer awareness of vehicle options and educate customers on technologies that can be easily integrated within their current lifestyle. Likewise, the federal government should consider a similar campaign with substantially larger budget on a national level.

3. [Infrastructure](#)

As noted earlier, infrastructure – EV charging and hydrogen fueling stations – raise consumer awareness, normalize the technology, and assure customers that fueling is available. Highly visible fueling stations and signage are effective methods of raising consumer awareness and comfort with EVs.

4. [Public and Commercial Private Fleets](#)

As a first step, CARB should acknowledge that reaching 20, 50, or 75 percent (or more) ZEVs requires substantial fleet participation and should agree to require fleet purchases at the same time, as the vehicle sales mandate programs. The simple truth is this: sales require purchases, and sales mandates should be matched by purchase mandates for state and local government fleets as well as commercial or business fleets. In most cases, CARB reports large life-cycle cost savings associated with ZEVs (low fuel costs and minimal maintenance costs) – fleet managers should welcome such savings.

Public and private fleet purchase requirements also dramatically increase consumer awareness. For example, rental cars offer potential EV buyers a risk-free opportunity to experience and drive EVs. For most people, a vehicle purchase is the most expensive purchase of their life, other than a house. If a customer could rent an EV for a few days or a week, she or he could decide if it meets their needs without substantial risks. Most people who try an EV love the EV

driving experience. Moreover, since the rental car fleet typically turns over much faster, these EVs will move into the used vehicle market quickly, further expanding EV penetration.

Corporate, state, and local fleet EVs provide employees experience with EVs and increased public visibility. Governor Brown recognized the benefits of electrifying fleets in the direction to ARB contained in his August 2018 letter¹⁸ on fleet requirements, stating:

Accordingly, I am directing the California Air Resources Board to assess the viability of new regulations to increase zero emission vehicle adoption in fleets across the state. This assessment should consider fleet categories such as rental cars, large employers, delivery vehicles as well as transportation service fleets.

Four years later, we are not aware of any response to Governor Brown.

Production

Factories, labor, supply chain security, and critical minerals are not the purview of CARB, yet are influential in the ability to grow EV sales in the U.S. The proposed ACC II requirements, however, contemplate a complete transformation of light-duty transportation and doing so will either affect or be affected by these very substantial issues. Thus, while these may not be CARB's domain, it is necessary for CARB to understand the importance of factories, labor, supply chain security, and critical minerals in relation to the proposed requirements. We encourage CARB to follow these developments and regularly report to the Board on the status of key developments, including but not limited to: refueling infrastructure, battery production capacity, critical mineral costs, efficiency improvements of battery technology, and affordability and equity considerations that include vehicle availability and price for both ICE and EVs.

Other Issues Under ACC II

1. PHEVs

Plug-in hybrid electric vehicles are a critical piece of developing and expanding the ZEV market. These vehicles are powered by a combination of a battery on-board the vehicles and a gasoline engine. Battery range currently varies between 15 and 45 miles, at which point the gasoline engine seamlessly operates to drive another 350-615 miles. Refueling time for the gasoline engine is 5 minutes, and "refueling" time to charge the battery is typically under 8 or 10 hours even using L1 charging on a common 120v household outlet or faster with a L2 charger.

PHEVs under the proposed regulations should operate on electricity from the grid about 50 percent of the time on average, and this portion of driving on electricity will increase with more public charging. Moreover, by 2030, the regulations will require PHEVs to operate 50 miles (or

¹⁸ https://ww2.arb.ca.gov/sites/default/files/2020-06/zero_emission_fleet_letter_080118_ADA.pdf

about 70 percent of the time) on electricity from the grid. These vehicles act as a bridge to full electrification by allowing customers to experience electrification and the low cost of operation without any “range anxiety” concerns. Moreover, for single vehicle households, PHEVs may be the only option available that will meet all their travel needs.

With the right support measures, BEVs can replace a substantial portion of the new vehicle fleet. However, larger, less aerodynamic, higher-payload Class 2a vehicles that tow long distances like pickups and larger SUVs used by farmers, commercial gardeners/landscapers, and recreational vehicle enthusiasts, are likely to be the domain of either gasoline, diesel, PHEVs, or FCEVs for some time to come. The current and foreseeable battery technology simply does not have the energy density, power, or capacity to tow or haul thousands of pounds over long distances. FCEVs provide this capability and can replace gasoline and diesel vehicles once sufficient hydrogen fueling infrastructure is available, but hydrogen fueling is currently limited.

Electrifying a mile from a larger vehicle can provide twice the environmental benefits compared to a mile from a smaller vehicle. Likewise, drivers of larger vehicles will see far greater fuel cost savings and thus have more incentive to charge frequently than drivers of smaller, more efficient vehicles. While electrifying miles of larger vehicles provide more benefits (to the environment and consumers), they will also be far more costly to develop and produce.

We recommend CARB extend the Partial Credit PHEV provisions currently in the proposed regulations for two years (until 2030 model year) for Class 2a vehicles only. These vehicles would provide substantial environmental and economic benefits.

2. [LEV Criteria Emissions](#)

As noted above, automakers will spend \$515 billion dollars by 2030 as a down payment on a net-zero future, but far more will be needed. If we hope to transition to electric, automakers must focus resources on that technology rather than simultaneous requirements on marginal improvements to gasoline vehicles. We support changes that can be made cost-effectively through calibration changes to the vehicle, and most of the changes proposed fall into this camp. However, changes that require large capital improvements (e.g., additional testing labs or production facilities) or require additional hardware on vehicles should be avoided.

Conclusion

We sincerely appreciate the work and thought that CARB staff put into the ACC II regulations and their tireless work with the industry to understand and work to address our concerns. We are committed to working cooperatively and constructively with CARB over the coming years to implement the regulations. We provide some additional specific recommendations on battery durability, ZEV, and criteria proposed regulatory changes in the attachments.

Sincerely

A handwritten signature in blue ink that reads "Steven P. Douglas". The signature is fluid and cursive, with the first name "Steven" and last name "Douglas" clearly legible.

Steve Douglas
Vice President, Energy & Environment

Copy: ARB Members
Richard Corey
Craig Segall
Jennifer Gress
Michael McCarthy
Joshua Cunningham

Attachments