October 16, 2020

California Air Resources Board (CARB)
Board 1001 I Street
Sacramento, CA 95812

Submitted to cleancars@arb.ca.gov

Re: September 16 workshop to discuss Advanced Clean Cars (ACC) II
Dear CARB Staff:

The Strong Plug-in Hybrid Electric Vehicle (PHEV) Coalition appreciates this opportunity to comment on this workshop on ACC II.

Established in July 2019, the Strong PHEV Coalition is comprised of over 20 electric transportation experts with more than 300 years of collective professional experience. We represent expertise in most disciplines of the EV industry including research and academia, vehicle manufacturing and deployment, policymaking, utilities, NGO advocacy, consumer education, EV fleet management, and charging infrastructure development.

With the specific goal to support California's and the United States' efforts to reduce GHG emissions, the Coalition educates regarding more electrified variants of PHEVs (i.e., mid-range or long-range PHEVs) that drive most of their miles powered by clean electricity. Additionally, the Coalition advocates for regulations and incentives that encourage the strongest PHEVs.

Strong PHEVs should have a long-term role in California. To that end, we offer recommendations for controlling their NOx and MNOG emissions and the proposed changes to the NMOG+NOx fleet average, and general comments on ZEV assurance.

General comments

The Strong PHEV Coalition defines a **Strong PHEV (SPHEV) as a mid-range or long-range plug-in hybrid (car, truck, or commercial vehicle) that drives most, or almost all, of its average annual miles from low-emission electricity.** The second propulsion system can be an internal combustion engine or fuel cell and should be capable of using very low-carbon fuel. Strong PHEVs must be safe and roadworthy in any driving mode, mostly eliminate daily cold starts, and be tested for performance and emissions on an established test cycle that most closely matches real-world driving. A Strong PHEV's engine should rarely—if ever—come on when there's ample battery state-of-charge, and require minimal or no engine maintenance for the life of

the vehicle. Strong PHEVs should be able to use commonly-established connectors for AC or DC charging.

We believe that regulations and incentives have not been sufficient to encourage mid-range and long-range plug-in hybrid cars and trucks, especially those that can achieve 90% or more of their annual miles using electricity. These PHEVs—in combination with battery-electric cars and trucks—provide more opportunity to accelerate electric transportation adoption in the near-to-mid term than BEVs and fuel cell EVs alone.

We know from experience that many retail and fleet customers will first adopt a PHEV instead of a BEV to gain plug-in confidence. More, just as there was a lack of electric service in rural areas a century ago and a broadband digital divide today, these areas still have inadequate DCFC infrastructure, excessively long distances to these chargers, or towing requirements that favor a PHEV powertrain. Many of these users may ultimately transition to BEVs. Still, a long-term pathway requiring increasing battery range and the use of advanced renewable fuels in PHEVs will preserve a wider variety of options as we collectively nudge them away from current internal combustion and diesel vehicles.

Strong PHEVs have the following key attributes:

- Complimentary to Battery Electric Vehicles, while supporting faster market expansion
- Can provide extended range and on-site auxiliary power during catastrophes
- May provide back-up power and resiliency to the electric grid
- Reduce range anxiety and infrastructure cost for commercial fleets
- Broaden the used EV market in all vehicle classes
- Expand EV opportunity to rural and disadvantaged communities, particularly in colder regions
- Serve as a platform for advanced batteries, fuels, and engines
- Lower cost to the electric distribution grid

Further explanation about these features can be found below; the collectively argue for both including and encouraging Strong Plug-in Hybrids across the spectrum of CARB policy.

In previous comments to CARB about the E3 report and presentation regarding 2045 carbon neutrality, we noted this statement by E3:

> *Many key uncertainties remain around the achievement of carbon neutrality in California. One of these uncertainties is the optimal use and deployment of zero-carbon fuels in hard-to-electrify sectors, including certain high temperature*

industrial processes, heavy-duty long-haul trucking, aviation, trains and shipping. These fuel uses may be met with a combination of fossil fuels, hydrogen, synthetic zero-carbon fuels or biofuels. It is still uncertain how the relative costs of these technologies will evolve over time. As the cost of wind and solar decline, the cost of renewable hydrogen production is also falling, making hydrogen a more attractive solution than biofuels for some applications. The market for sustainable biofuels remains nascent, making it uncertain how much sustainable biomass supply will be available, and what the best uses for these biomass resources will be through mid-century.[1]

This uncertainty argues for CARB to be broad-minded and nimble in adopting regulations, plans, and incentives to reach the 2045 carbon neutrality goal. For example, CARB should accommodate light-, medium-, and heavy-duty strong plug-in hybrid electric vehicles in regulations, plans, and incentives, and encourage the use of advanced biofuels in them. Additionally, inherently dual-fueled strong PHEVs should be encouraged in use cases most challenged by BEV implementation, including agriculture, locomotives, marine, aviation, recreation, and other sectors where non-road equipment is used.

More specific to the ACC II rulemaking, strong PHEVs are particularly suited to help speed adoption of ZEV technologies in class 2a vehicles, where deployed EVs lag relative to class 1 or even heavier vehicles.

NOx and NMOG emissions

We recognize CARB staff's concerns regarding high-power cold start emissions from PHEVs and believe additional regulation is needed to address their NOx and MNOG emissions profile. However, these differ across PHEV models; in several, the engine does not engage until the battery is depleted, causing few cold starts (at high or low power).

We encourage CARB staff presentations to reflect this diversity, differentiating between the several types of non-blended and blended PHEVs and show the big picture: their total daily NOx and THC emissions on a per-vehicle basis versus ICE vehicles. Showing total low- and high-power cold start emissions would be additionally useful. NOx and NMOG emissions for PHEVs, including those that have the engine engage at lower speeds, the high-power cold start emissions issue is technologically solvable through several different control strategies (e.g., pre-heating the catalytic converter with the battery). Both CARB's EMFAC team and UC Davis have data on this topic.

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[1] E3 Report page 11

Regarding the proposed changes to the NMOG+NOx fleet average, we advise treating PHEVs the same as BEVs and FCEVs. In other words, all vehicles with ZEV miles should be in the new NMOG+NOx fleet average in ACC II.

ZEV assurance issues

Regarding the ZEV assurance proposals (slides 41-49), we are generally supportive of standardization and simplification to boost consumer confidence. However, we would like to see more detail about these proposals before commenting further. We note that strong PHEVs are a great way to address the questions on slide 41, increase success for at-scale adoption of vehicles with zero-emission miles, and overcome consumer hesitation to purchase ZEVs.

Thank you for your commitment to zero-emission mile technology and the development of this regulation and for the opportunity to comment. We look forward to continued dialogue and participating in future ACC II workshops.

Sincerely,

Bob Graham and Chelsea Sexton
Co-Chairs of the Strong PHEV Coalition

Strong Plug-in Hybrid Key Benefits

Enable more rapid EV market growth, as Strong PHEVs compliment ZEVs:

While we do not uniquely advocate for them within this group, Coalition members support Zero-Emissions Vehicles, particularly Battery Electric Vehicles (BEVs); accordingly, SPHEVs are not proposed to compete with them. They do, however, offer a compelling, near-zero-emissions option for individuals and fleets who don't yet find BEVs viable. SPHEVs are meant to "compete" with traditional gasoline-only or other less-efficient, more-polluting vehicles. Specific requirements may vary with vehicle class and type, but with a battery range of 35-90 miles, for example, nearly all of most users' daily driving would be fully electric.

The flexibility of SPHEVs can alleviate unique range anxiety concerns in an expanding number of key use cases with variable distance requirements, such as goods delivery and ridehailing services. Both fleets and commuters benefit from vehicles that may use—but are not dependent on—faster, more expensive DC charging, lowering both capital investment and/or operation cost. This is especially important in rural and disadvantaged communities, where users tend to be both more budget-constrained and starved of sufficient, affordable, public charging. As more charging is deployed, these SPHEVs will become "increasingly" electric.

SPHEVs can support congestion charge schemes, "emissions-free zones", or other local vehicular pollution policy, either through a manually-enabled "hold mode" featured on many of today's models, or automatically-geofenced transition systems currently in development.

Strong PHEVs support smart grid management and integration:

Using smaller batteries than BEVs, and with the flexibility to charge at lower-power 240v "L2" (or even 120v "L1") charging speeds, SPHEVs take full advantage of overnight or other off-peak charging periods, maximizing grid asset utilization and resulting cost management.

While SPHEVs may not be dependent on DC charging, the inclusion of this feature provides both electric range extension and, for some models, bi-directional power capability. This allows the vehicle to provide exportable power to a home or other site, or even to the grid itself, for emergent needs or arbitrage purposes. Using them for this purpose can alleviate the need for redundant stationary storage batteries.

When crucially required, the secondary fuel in SPHEVs can also be used to extend this ability, making them ideal for municipal and other resilience needs.

Long Term Technology Solutions

A key advantage of SPHEVs is their political and technological common ground with both incumbent petroleum-based fuels and more renewable alternatives. While most

use gasoline as their secondary fuel today, the Strong Plug-in Hybrid Coalition encourages replacement with cleaner fuels over time.

It is also critical to resilience and revolution in transportation to research, develop, and implement technologies that build on technological successes to date. California has—and is—playing an important role in this path.

Strong Plug-In Hybrids present an optimal platform to incorporate many of these developing technologies, whether the above-mentioned fuels, or batteries, motors, and engines advancing with a focus on increasing efficiency, reducing the use of certain materials, light-weighting, and other goals.