November 9, 2020

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

Submitted to mss@arb.ca.gov

Re: Late comments on Oct 7 workshop to discuss 2020 Mobile Source Strategy (MSS)

Dear CARB Staff:

The Strong Plug-in Hybrid Electric Vehicle (PHEV) Coalition appreciates this opportunity to comment on this workshop on the 2020 MSS.

Established in July 2019, the Strong PHEV Coalition is comprised of over 30 electric transportation experts with more than 400 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 a significant majority 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.
We appreciate that the draft MSS contains PHEVs for light duty vehicles. However, as we explain in these comments, we believe that PHEVs should play a role in the other sectors (e.g., heavy duty vehicles, marine, aviation, off-road) and that strong PHEVs can offer even more benefits for the light-duty vehicle sector than those listed in the MSS discussion draft.

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 ideally 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. Over time, the definition of a Strong PHEV should be strengthened but take into account the different use cases of the different types of on-and off-road vehicles/equipment/vessels.

Strong PHEVs have the following key attributes:

- Complimentary to battery EVs, while supporting faster market expansion than an battery EV only scenario
- 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 and homes
- 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
- Can be used in marine, aviation, and off-road sectors too.

We support the PHEV recommendations in tables 3 and 8 in the MSS discussion draft, but believe that with Strong PHEVs, the recommendations could be even stronger because strong PHEVs:

- are particularly suited to use of hydrogen or ultra-low carbon fuels,
- can further reduce NOx and ROG emissions due to regulations that essentially eliminate high power cold starts[1]
- and can have even higher all electric ranges (than listed on page 62[2]) in coming decades.

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*

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[1] For example, PHEVs can do much better than what is shown in EMFAC 2017 for NOx and ROG emissions (page 55). For NOx and NMOG emissions from 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.

[2] Light duty cars with an all-electric range (AER) of 52 miles or 70% of all miles, and light duty trucks with an AER of 28 miles and 50% of all miles.

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.[3]

The uncertainty that E3 finds argues for CARB to be broad-minded and nimble in adopting regulations, plans, and incentives to reach the 2045 carbon neutrality goal. And this uncertainty also argues that the final 2020 MSS should accommodate light-, medium-, and heavy-duty strong PHEVs 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. By focusing on telling industry, fleets and consumers what to achieve rather than how to achieve it (fuel and technology neutral approach) will result in faster adoption than only relying on battery EVs and fuel cell EVs in the non-light-duty vehicle sectors.

Regarding NOx and ROG emissions, we support making this a non-issue for strong PHEVs by having stringent regulations that eliminate high power cold starts and evaporative emissions. Such an approach will allow for strong PHEVs to be more easily compared on GHG emissions to battery EVs and fuel cell EVs because criteria pollutants become a non-issue between the three types of vehicles. Also we support a technology-forcing regulatory approach to require more all-electric range over time and more use of ultra-low carbon biofuels, in order to reduce strong PHEV's GHG emissions (well-to-wheel) to essentially zero for every category of transportation.

We know from experience that many retail and fleet customers will first adopt a PHEV instead of a BEV to gain plug-in confidence. Moreover, 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 battery EVs. 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.

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[3] E3 Report page 11

Regarding the cost of PHEVs (see page 64), we suggest that CARB staff should look at the bigger picture, because PHEVs will require much less charging infrastructure in homes, fleets and public locations and save substantial money due to fewer electric distribution system upgrades. This also results in benefits to the total cost of ownership (TCO) from the consumer perspective. The Strong PHEV Coalition will be providing more detailed analysis on the TCO of strong PHEVs in the future. The real question on cost is whether there are residences and fleets that want and need PHEVs and are willing to pay for them. Well-designed incentives and regulations in the various transportation sectors will result in at least a few manufacturers that will build them. And having at lease some manufacturers of PHEVs in the long-term is important globally as many countries will need them for a long time (e.g., to address catastrophes, equity, and need for faster adoption).

Thank you for your commitment to zero-emission mile technology and the development of the MSS and for the opportunity to comment. We look forward to continued dialogue. In the appendix to this letter is more detail on the benefits of strong PHEVs.

Sincerely,

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Co-Chairs of the Strong PHEV Coalition

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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 strong PHEVs 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.