Though desirable in the initial stages, unless mitigation steps are undertaken, battery technologies can potentially seriously injure AB 617 communities.

ARB's proposal for an Advanced Clean Fuel Truck Regulation is laudatory, given that NOx emissions from current diesel trucks contribute substantially to ozone and PM2.5 pollutants, disproportionately affecting AB 617 disadvantaged communities.

However, there is a major concern. Batteries may haunt such disadvantaged communities 15- 20 years after its introduction now.

The EIR for the proposed regulation must specifically address the following issues

ARB's current move into zero-emission technologies heavily emphasizes battery electric technology. The current ARB approach towards batteries is not sustainable. *A sustainable approach is sorely needed.* Mitigation measures should be adopted to get the best benefits of battery technologies while not polluting the environment once the batteries are exhausted, and need recycling. Let me elaborate.

1. A battery electric truck is expected to carry about 5,000 lbs worth of lithium-cobalt batteries. This weight is about two orders of magnitude more than the standard lead-acid battery, onboard current diesel trucks, which weighs about 50 lbs. So where will these huge amounts of batteries end up after their use in battery EV trucks?
2. ARB's response is that these large battery packs, after use in transportation, can be used in secondary markets such as back-up storage for electricity.
3. There are several concerns with this statement. Few of them are listed below
4. Albeit highly desirable in concept, ARB must fund several projects and provide <u>empirical evidence</u> for such secondary use. From a scientific viewpoint, though useful, conceptual projections are not adequate. Evidence and limits, if any, of such secondary use must be demonstrated and verified.
5. Secondary use, however desirable, merely extends the battery life. At some point, these batteries will be so exhausted that these cannot be used further. At that juncture, immense almost skyscraper volumes of battery waste will be created. For certain, several times the volume and weight of existing battery waste.
6. For last 30 years, neither ARB or CEC or South Coast AQMD have treated battery waste pollution as mere footnotes. With millions of EV cars and tens of thousands of battery EV trucks being planned, we cannot afford to remain negligent. With each battery EV carrying several times larger battery packs than the current gasoline vehicles, unless mitigated, a disaster is in the making.

The following questions need to be specifically addressed by ARB

7. ARB needs to project the actual number of battery recycling centers that are needed. In Southern California, two large battery recyclers (GNB/Exide and Quetmco) used to recycle lead acid batteries from current gasoline vehicles. Now assume that the

battery pack in each new battery EV car or EV truck is at least 10 times larger (often it is much larger than that). Of course, we will need 10 times the current # of recyclers. So if there are 2 current recyclers, there will be a need for 20 battery recyclers - or 10 times current lead-acid battery recycling capacity.

8. ARB must factor in the economic cost of building ten times the current battery recycling capacity. It may run into hundreds of millions of dollars.
9. Besides ARB must project where these large battery recyclers will be ultimately located. For sure, rich neighborhoods like Bel-Air, Beverly Hills, Malibu, NewPort Beach won't openly embrace such EV battery recycling facilities. These new facilities, by definition, will be located in AB 617 communities. Thus, using battery EVs, ARB will clean the air in AB617 communities, ARB regulation will end up polluting the environment by establishing large battery recyclers in such communities. The EIR must address potential Solid waste, air, toxic emissions, and other media emissions, from these recyclers.
10. ARB must compare emissions from future lithium -cobalt battery recycling plants - and there will be dozens of them - to the current lead acid battery recycler, GNB. Residents near GNB facility, located in Vernon, southern CA, a AB 617 community brought a serious lawsuit against GNB/Exide regarding its lead and other emissions. Though the emissions of future lithium batteries won't contain lead, there is a whole spectrum of air toxics that could be potentially released. Chief among them will be cobalt, nickel, resins, and fluorine compounds present in these lithium batteries. These and other other potential toxic emissions need to be thoroughly investigated.
11. Among the chief challenges in any form of recycling, even if the recycling facilities are super clean, is the issue of custody, namely custody and chain of control of the EV batteries when fully exhausted. In other words, how does a regulatory agency ensure, monitor and audit that these toxic batteries are properly collected, and are sent to recycling rather than being diverted and then dumped into our overburdened municipal waste and hazardous waste facilities.
12. Then there is the issue of the Great Escape. Failure to provide for 100 percent custody of these lithium batteries at the end of life, will result in these batteries being dumped into landfills, which are largely located in disadvantaged communities. If, however, these communities speak up and tell the regulators they don't want these extra battery waste, the waste will end up dumped into disadvantaged communities outside of California. In New Mexico, Nevada, Missouri, Texas etc.
13. Worse batteries shipped outside of California will be shipped to emerging countries of the Global South. You can view YouTube videos of large container ships carrying industrial waste from rich countries travelling to vulnerable developing countries. Communities in these poverty-stricken countries go beyond disadvantaged. They are severely malnourished and severely disadvantaged in every respect including income, housing, education, health, lack of voice. Lithium batteries that escape California will track the industrial waste routes and land up in these countries.
14. On the way to these emerging countries, some container ships may decide to dump battery waste into the ocean. As they doing with industrial waste now.

15, ARB should ban cobalt lithium batteries. Cobalt lithium batteries have been a show case of battery technologies all these years. They have performed well, and have shown durability. But the presence of cobalt is of severe concern. Cobalt is designated by ARB as a toxic chemical. Cobalt mining is occurring in severely disadvantaged communities world wide, particularly in Congo Republic. In this mining process, several dozens of children are experiencing serious physical injuries and even killed. This doesn't even take into account the long-term toxic impacts of being exposed to cobalt. Besides, when lithium batteries reach teh end of life, workers who handle the batteries during the recycling process will be exposed to cobalt. Most, if not all of these workers, are from disadvantaged communities. As mentioned earlier, any batteries that do not reach battery recycling facilities will end up in landfill waste or will be shipped outside of California to other disadvantaged communities worldwide - that in turn, will be exposed to cobalt emissions.

16. After literally 30 years of denying the problem exists, state of California has tasked Dept of Toxic Substances (DTSC) to address some of these issues. DTSC apparently is working with ARB, CEC and South Coast and other experts to address battery pollution and battery recycling from proposed battery EVs. This is a good first step. But let us not delegate DTSC this responsibility when the responsibility is squarely that of ARB, CEC and South Coast AQMD who are the primary movers of the battery EVS. DTSC is stretched thin. They lack staff even to address several dozen waste streams. Given that only a small percentage of consumer batteries (less than 10 percent) are recycled, even though there are good consumer battery recycling facilities, it doesn't give comfort that DTSC will have the resources to manage the impending battery waste tsunami from battery EV cars and trucks.

Proposed Mitigation Measures

(A) The latter 3 agencies should explore policy and regulations specifically addressing battery recycling alongwith the proposed Rule Making. Failure to do so, will seriously injure AB 617 communities down the line. To protect AB 617 communities, ARB should require battery makers to
(i) declare the content of each battery chemistry,
(ii) to take custody of all the battery packs, and
(iii) provide proof that these battery packs were properly and safely recycled.
ARB should establish monitoring, auditing and enforcement provisions to do so.

(B) ARB should ban all use of cobalt in lithium batteries. This will protect those children mining for cobalt in Congo and other places. It will protect workers who will handle the lithium battery packs at the end of life. Besides it will improve the safety of lithium batteries.

(C) ARB should explicitly encourage alternative battery chemistries to lithium cobalt. Most battery companies are exploring ways to move away from cobalt. ARB should accelerate such movement away. Disadvantaged communities in California and severely disadvantaged communities world wide would directly benefit if ARB embraces alternative more sustainable battery chemistries.

(D) Across all sectors, ARB should explicitly support large scale deployment of hydrogen fuel cell technology. Europe and Asia are doing so, and ARB should not be left behind. There is minimal footprint for fuel cell technologies at the time of disposal. Most fuel cells are very valuable and manufacturers have great incentive to take custody and recycle the contents, particularly platinum. Besides, the volume and mass of such fuel waste, if any, are magnitudes lower than a full battery EV.

(E) ARB must significantly support fuel cell technologies for both light duty and heavy duty vehicles. Light duty cars contribute significantly to global warming. Besides, both Tesla and Toyota have noted the importance of learning from light duty car experience to sharpen their respective battery EV and fuel cell EV technologies for heavy duty applications. Light duty experience provides direct experience for heavy duty applications, in terms of mileage gained, safety, performance, durability, handling etc. Encouraging light duty infrastructure (say building 1000 hydrogen stations in California by 2030 or earlier) will encourage all manufacturers to enter into the hydrogen fuel cell arena.

Want to thank ARB for adopting the proposed Regulation, But ARB efforts will be undermined if the above serious environmental issues are ignored.

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(To mitigate climate change, urban air quality and energy independence, we advocate hydrogen fuel cells, and sustainable battery technologies for transportation sector).

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