March 23, 2022

Ms. Rajinder Sahota, Deputy Director
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Comments on 2022 Climate Change Scoping Plan Scenarios - March 15, 2022, Workshop on Initial Modeling for Transportation Demand for ZEVs and Energy Demand by Fuel Type

Dear Ms. Sahota,

ZEVs are not Zero Emissions but have a Carbon Intensity of 62 to 90 (gCO_2e/MJ)

ZEVs are not zero greenhouse gas emission vehicles but have a carbon intensity of **62 to 90 (gCO_2e/MJ)** when combining the energy required to produce electricity to charge the battery and the manufacturing process of the battery. CARB's existing emissions factor, which accounts for the energy required to produce the electricity the charge the battery is **23.39 (gCO_2e/MJ)**. The range of emissions from the battery manufacturing alone, assuming a 100,000-mile lifespan, have a carbon intensity of **38.13 – 66.26 (gCO_2e/MJ)** depending on the type of ZEV battery.

AB 32 Climate Change Scoping Plan Statutory Requirements is to Minimize Leakage

ZEV batteries that are manufactured out of state are increasing non-Californian emissions in other states and countries in the amount of **38.13 – 66.26 (gCO_2e/MJ)** depending on the type of ZEV battery. CARB is picking ZEV as the technology winner while leaking emission out of state.

Environmental Justice for All?
CARB Should Not Exacerbate Harm to Disproportionately Impacted Communities

Cobalt is mined by forced child labor in the Democratic Republic of the Congo. Think about the extraordinary volume of water and resources used to mine rare minerals for the car's Battery Electric Vehicle (BEV). Amnesty International has documented serious human rights violations linked to the extraction of the minerals used in lithium-ion batteries. Think about the environmental degradation the BEV car imposes on Mother Earth, outside of California on the people of Africa, China, South America, and first nations people of Canada. The Environmental Justice Advisory Committee should be briefed and provide input on this topic.

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Edgar & Associates submits our comments and the attached White Paper based upon European studies regarding the carbon intensity of ZEV batteries. On behalf of our fifty public and private sector clients that operate permitted waste facilities involved in the collection, hauling, processing, and composting of green and food waste materials throughout California, we base our decisions on defensible science and lifecycle carbon accounting. Our clients collect organic waste at the curb in heavy-duty vehicles that have been transitioning from diesel to near-zero NOx trucks. Many are using in-state, carbon-negative, renewable natural gas (RNG), that many of our clients produce. After processing organics which are diverted from the landfill to achieve SB 1383 mandates that reduce short-lived climate pollutants, our clients haul the compost, digestate, and wood chips in heavy-duty transfer vehicles. Our clients are in the wheelhouse of the circular economy mitigating methane where the work so far on the Scoping Plan 2022 Update fails to place short-lived climate pollutant make it a priority in the near-term and picks BEVs as a winner by 2045.

Methane is a short-lived climate pollutant that is 84 times stronger than CO_2 over a 20-year period. NASA flew over California landfills and published an inventory showing them as super emitters of methane. When the Governor announced his goal for carbon neutrality by 2035, it was the distinguished Dr. Ram Ramanathan that presented that methane mitigation was the only tool left to bend the climate curve before irreversible damage is done to this earth, since methane has short-lived impacts over 20 years. President Biden unveiled a U.S. Methane Emissions Reduction Action Plan that redoubles efforts to reduce methane . With a Code Red for Humanity announced by the IPPC, action is needed in the near-term. At the United Nations COP26 meetings in Glasgow more than 100 countries joined a U.S. and E.U.-led coalition to cut 30% of methane emissions by 2030.

Our clients have been transitioning from diesel to near-zero low NOx trucks, using their own RNG or in-state RNG. At this time and for the near-term, heavy-duty BEVs neither have the duty cycle, charging infrastructure or grid reliability plus lack the cost-effectiveness as BEV trucks cost almost twice as much, needing 2:1 replacement compared to low NOx RNG trucks. **AB 32 Climate Change Scoping Plan Statutory Requirements is to support cost-effective and flexile compliance**, where heavy-duty ZEV provides neither.

Edgar & Associates has technical staff of engineers and environmental scientists competent in all aspects of life-cycle analysis (LCA) for low carbon fuel programs. Edgar and Associates regularly prepares Net-Zero greenhouse gas analysis, verified carbon footprints for The Climate Registry, material mass balances, and transportation emission calculations. Science supported LCAs should be used in all cases of carbon accounting and be an integral part of the Low Carbon Fuel Standard (LCFS). Edgar and Associates is technology neutral and carbon neutral now with the lowest carbon emission at the most cost-effective price and should be endorsed by CARB. All fuels options, including BEV vehicles, should determine their carbon intensity based upon an honest LCA.

CARB needs to Include ZEV Battery Manufacturing Emissions into the LCFS
Electric Vehicle Battery manufacture emissions must be included in the life cycle analysis of electric vehicle emissions. Unlike the tires, steering wheel, or frame of a car, the battery production emissions must be considered when comparing to other vehicles. These batteries, in addition to being 25 times heavier than the lead-acid batteries found in conventional vehicles also produce over 80 times the emissions during manufacture than lead-acid batteries. As BEV batteries must be replaced after a certain amount of use and contain the locomotive energy of the vehicle, they constitute fuel

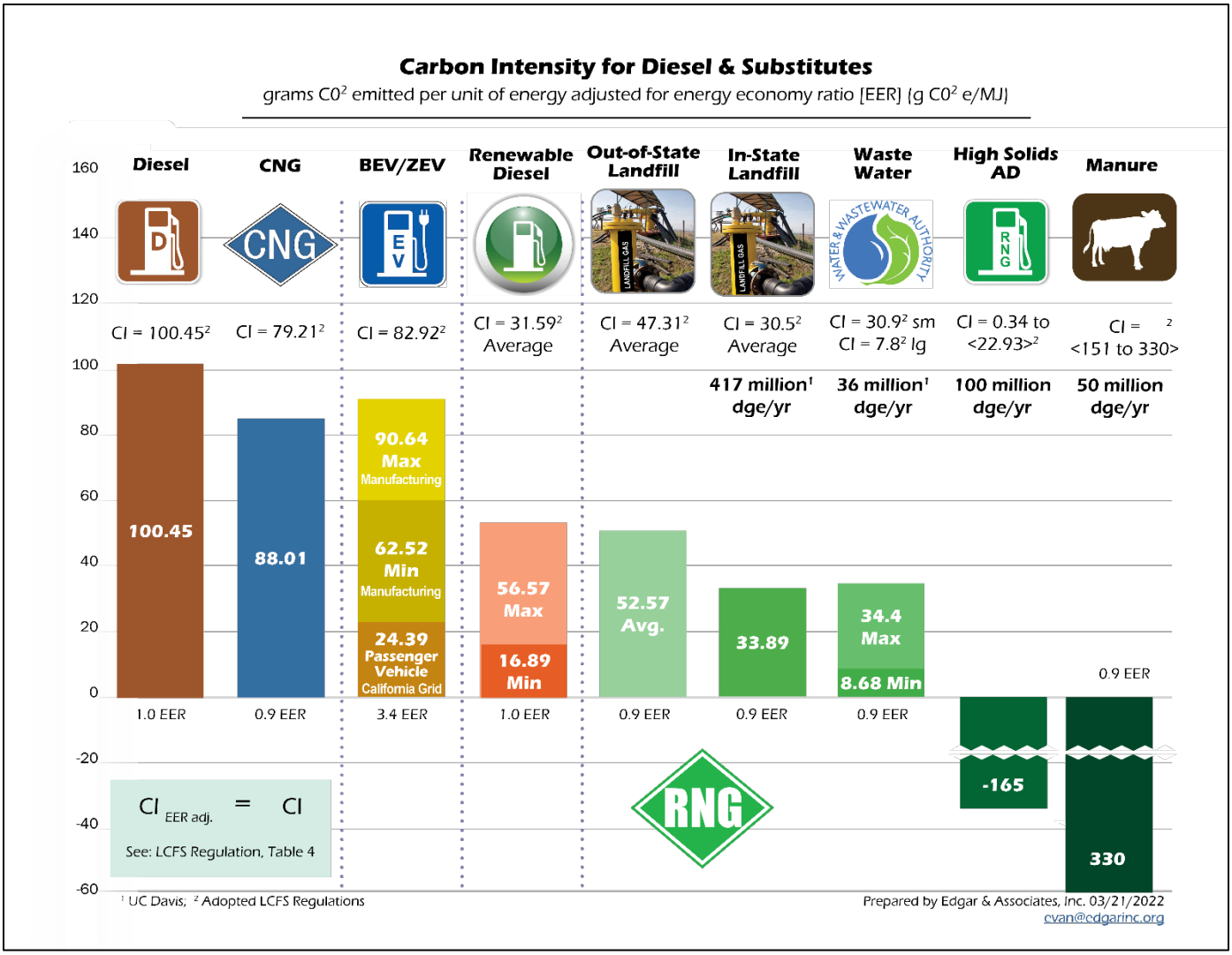
According to the Study, 'Effects of Battery Manufacturing on Electric Vehicle Life-Cycle Greenhous Gas Emissions, 2018' by the International Council on Clean Transportation, the following is quoted regarding including LCAs:

"The methodology used for a life-cycle assessment (LCA) can greatly influence its conclusions about the carbon intensity of batteries. An LCA can evaluate the environmental impacts of a system using either a bottom-up or top-down approach. A bottom-up approach incorporates the activity data for each stage of each component of a battery and aggregates these different components. In contrast, a top-down analysis first determines the total emissions from a plant and attributes these emissions to different processes. Top-down inventories tend to include more auxiliary energy uses, but they may double-count certain processes and emissions. In this context, top-down inventories typically find higher emissions, often by a factor of two or more."

Carbon Intensity
CARB determines the alternative fuel's carbon intensity (CI) value by dividing its Energy Economy Ratio (EER) in order to obtain the EER-adjusted CI value, representing the emissions that occur from the use of alternative fuel per MJ of conventional fuel displaced.

CARB determines ranges of CI for each type of fuel compared to the two baseline fuels (gasoline and diesel). Each marker represents an individual certified fuel pathway CI, adjusted by the EER. There is a range of carbon intensity that may be achieved by a fuel pathway. The wide range of carbon intensities is due to the life cycle emissions methodology of the LCFS, variations in feedstock types, origin, raw material production processing efficiencies, and transportation, all of which contribute to an individual producer's fuel pathway CI. All valid CI values shown are certified including legacy, Tier 1, Tier 2, and Lookup Table pathways, and presented in the graph on the same page.

The range of emissions from the battery manufacturing alone, assuming a 100,000-mile lifespan, have a carbon intensity of **38.13 – 66.26 (gCO_2e/MJ)** depending on the type of ZEV battery. CARB needs to determine the CI for the LCFS program by using a bottom-up approach for battery manufacturing and provide a range of CI values such for other alternative fuels on top of the energy required to produce the electricity within the battery which is **23.39 (gCO_2e/MJ)** as shown on the graph on the next page. ZEVs are not zero greenhouse gas emission vehicles but have a carbon intensity of **62.53 to 90.64 (gCO_2e/MJ.)**



In 2009, the Global Trade Analysis Project (GTAP) model was adopted with the original LCFS adoption. In 2011, CARB directed staff to continue working with interested stakeholders to update the indirect land use change (ILUC) carbon intensity values for various biofuels. Staff has been collaborating with stakeholders, and as part of the 2015 LCFS re-adoption, the GTAP model was updated, and the AEZ-EF model was created to supplement GTAP's estimates of greenhouse gas emissions from various types of land conversions. Mining of minerals for BEV batteries is an indirect land use change and CARB should develop models used for the land use change assessment with supporting documentation and BEC battery manufacturing.

Table H-5 from CARB's Methodology for Detailed Analysis for Indirect Land Use Change (ILUC) summarizes the iLUC values for all the 6 biofuels analyzed for the LCFS regulation. The values are the average of 30 scenario runs for each biofuel. Complete details for each of the biofuels are also provided in this methodology.

Biofuel	iLUC (gCO_2/MJ)
Corn Ethanol	19.8
Sugarcane Ethanol	11.8
Soy Biodiesel	29.1
Canola Biodiesel	19.4
Sorghum Ethanol	14.5
Palm Biodiesel	71.4

In summary, the following comments are filed:

- CARB has a statutory requirement to minimize leakage when considering the AB 32 Climate Change Scoping Plan Update and needs to address the carbon intensity of BEC battery manufacturing.

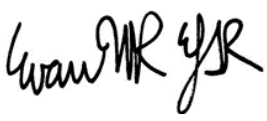
- CARB has a statutory requirement to support cost-effective and flexile compliance when considering the AB 32 Climate Change Scoping Plan Update, where heavy-duty ZEV provides neither.

- CARB should include BEV Battery Manufacturing Emissions into the LCFS since the core tenets of the LCFS is based on life-cycle analysis.

- When modeling for Transportation Demand for ZEVs and Energy Demand by Fuel Type, the carbon intensity of the BEV batteries should be based on an honest life-cycle analysis referencing the European Studies.

- CARB's Environmental Justice Advisory Committee should be briefed and provide input on the forced child labor in the Democratic Republic of the Congo and review Amnesty International documents on the serious human rights violations linked to the extraction of the minerals used in lithium-ion batteries. The EJAC should consider the extraordinary volume of water and resources used to mine rare minerals for the car's BEV, and the environmental degradation the BEV car imposes on people outside of California on the people of Africa, China, South America, and first nations people of Canada.

Sincerely,



Evan WR Edgar - Regulatory Affairs Engineer