January 7, 2022

Cheryl Laskowski, Ph.D.
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: CARB should incorporate electric tractors into the Low Carbon Fuel Standard

Dear Dr. Laskowski,

Monarch Tractor appreciates the opportunity to submit comments regarding potential changes to the Low Carbon Fuel Standard (LCFS), as presented at the December 7, 2021 workshop. We strongly support the LCFS, as well as the proposal to strengthen the program over the near and long-term, in line with the State's climate change and carbon neutrality goals. The LCFS has proven tremendously successful, and we support changes in the next rulemaking to ensure its ongoing success for both the on-road and off-road transportation sectors.

About Monarch Tractor

Monarch Tractor is an innovative, mission-driven company, headquartered in Livermore, California developing driver-optional electric tractors. We are committed to enabling clean, efficient, and sustainable farming practices by making them economically viable. The Monarch Tractor brings together the benefits of electrification, automation, and insightful data to enable farmers to transition to more productive, precise, and sustainable farming practices. Providing a superior platform for farmers, Monarch Tractor is focused on delivering meaningful change for today's farmers and the generations of farmers to come.

Monarch's compact tractor is an attractive platform for significantly reducing criteria and greenhouse gas emissions in the agricultural sector. The compact tractor segment offers the opportunity for some of the most significant and cost effective diesel emissions reductions due to its high volume, high utilization, and significant annual growth.

Monarch Tractor offers a zero-compromise solution, including equal or greater performance compared to even the most advanced diesel tractors. A swappable battery assembly allows for near continuous operation and allows operators to re-charge during non-peak rate hours. Autonomy adds the benefit of worker safety – from keeping humans out of the fields when Air Quality is hazardous to keeping workers safe with human detection and auto braking.

Add EER value for electric tractors

As CARB considers amendments to the program to ensure its ongoing success and alignment with the latest technology, market and policy developments, we encourage you to incorporate

electric tractors into the program, in order to ensure the LCFS is providing benefits and market signals to decarbonize agricultural and other off-road sectors, not just cars and trucks. Specifically, we support CARB re-evaluating energy economy ratios (EER) and developing new ones for emerging technologies, including electric tractors. We would be happy to work with CARB and support a process to identify appropriate values for EER for electric tractors.

Market support for driver-optional, electric tractors aligns with CARB priorities

Identifying EER values for electric tractors will allow this rapidly expanding electric vehicle market to participate in the LCFS fully and accurately, and aligns with CARB priorities for decarbonizing heavy-duty transportation. In its 2020-2021 Long-Term Heavy-Duty Investment Strategy,[1] CARB specifically recognizes the efficiency and safety benefits associated with off-road vehicles operating in autonomous mode:

> "Generally, CARB considers connected vehicle technologies as having a 'multiplier' effect… their inclusion in projects paired with advanced cleanest combustion, hybrid, and zero-emission powertrains can extend the effectiveness of these systems and should be encouraged." (pg. D-69)

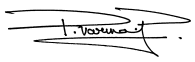
The strategy further identifies ongoing barriers to adopting these promising technologies, including costs, low diesel prices, and lack of understanding around the business case, while specifically stating that, "Off-road connected and automated work site demonstrations are ripe arenas for investment because of their ability to reduce emissions and increase productivity in otherwise hard to address sectors… Construction and agricultural are promising candidates." (pg. D-71)

Enabling driver-optional electric tractors to participate in the LCFS, with appropriate EER values, will add value to the market to help overcome these barriers and accelerate adoption of zero emission vehicles in off-road and agricultural sectors, in line with CARB's objectives.

Thank you again for the opportunity to comment on this workshop and provide input on potential changes to the LCFS. We look forward to next steps in this process and working with you to ensure the LCFS's continued success – and making sure it reaches all transportation sectors, including off-road applications in the agricultural sector. Please let us know if you have any questions about these comments, our company or technology.

Thank you,

Praveen Penmetsa
CEO and Co-Founder
Monarch Tractor



[1] https://ww2.arb.ca.gov/sites/default/files/2020-11/appd_hd_invest_strat.pdf