Rondo Energy, Inc.
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Cheryl Laskowski
LCFS Branch Chief
California Air Resources Board

January 7, 2022

Via electronic submittal: LCFS Comment Docket

Re: Rondo Energy Comments on December 7, 2021 Workshop: Potential Future Changes to the LCFS

Rondo Energy appreciates this opportunity to submit comments regarding potential changes to the LCFS regulation. Rondo Energy (Rondo) strongly supports CARB's ongoing efforts to solicit the latest information and the lowest-cost, lowest-risk pathways to achieve California's climate, environmental, and economic goals. Rondo submitted previous comments to the Fall 2021 LCFS workshop and incorporates them by reference here[1].

Rondo is a California-based company providing zero-carbon energy for industrial processes and power generation, including for transportation fuel extraction and refining. Rondo's technology delivers industrial process heat without combustion and is powered 100% by renewable electricity. Our technology and others like it (so-called "indirect electrification") can reduce the carbon intensity of all liquid fuels by 20% to 50%, by eliminating the CO_2 emissions in their production and refining. The indirect electrification of process heat for all liquid fuels in California is an early-action opportunity to make rapid reductions in the CI of the fuels in use today which delivers ongoing total reductions as the fuels mix changes over time.

The LCFS today includes both pathway and project provisions for credit generation which are founded on lifecycle assessments of emissions reductions. These provisions provide critical support for the capital investments needed to decarbonize the process heat being used to produce fuels in California. Rondo strongly supports the strengthening and retention of these provisions in the regulation, both for biofuel and petroleum fuel production.

Studies have shown that indirect electrification of process heat in California fuel production will lower the CI of existing fuels, improve air quality in critically impacted communities, improve the reliability of California's electric grid, and provide significant in-state employment and economic benefits. The benefits of the liquid fuel provisions of the LCFS have already been shown to have climate-positive impacts beyond California's boundaries. Such "exportability" was a key point highlighted in the workshop. During the workshop, we cited an example of how today's Innovative Crude provisions supported the development of new technologies that are now in large-scale operation in the Middle East.

Rondo respectfully argues that **both the biofuel and petroleum fuel (innovative crude and project) provisions of the LCFS should be retained and strengthened**, as both are important to the achievement of the goals of the program and strongly beneficial to California's climate and economic justice goals overall.

We have submitted several letters to the 2022 Scoping Plan Update. That very important planning document will lay out the future of transportation fuels in California. Staff discussion during the recent LCFS workshop rightfully highlighted that the Scoping Plan will lead, and the LCFS amendments will follow. Subsequent to the December LCFS workshop, CARB released the revised modeling scenarios for the Scoping Plan[2]. These scenarios lay out

[1] https://www.arb.ca.gov/lists/com-attach/51-lcfs-wkshp-oct20-ws-U2EGMAExB2UBN1Jh.pdf
[2] https://ww2.arb.ca.gov/sites/default/files/2021-12/Revised_2022SP_ScenarioAssumptions_15Dec.pdf

four potential options for in-state crude production. The scenarios highlight 14-25 years into the future of in-state production.

The December workshop slides[3] introduce the concept that a phasing-out of Petroleum Project crediting is under consideration. We believe this is a significant policy reversal that is contrary to the goals of the program and is the wrong signal to send to the investment and compliance marketplace who are planning capital investments in decarbonization. Reducing the carbon intensity of the State's total transportation fuel feedstock is fundamentally the goal of the LCFS program. New technologies are at hand to deliver large-scale reductions in all liquid fuels but require stability in LCFS policies supporting their deployment.

Rondo respectfully recommends that CARB should build upon the Innovative Crude success to date and make it clear that it welcomes investment in reducing the CI of all fuels. Withdrawing petroleum project crediting will, with near certainty, increase total emissions over the next 15 years. Instead, CARB should focus on cutting the CI of California's existing petroleum fuels as their demand declines over the coming decade.

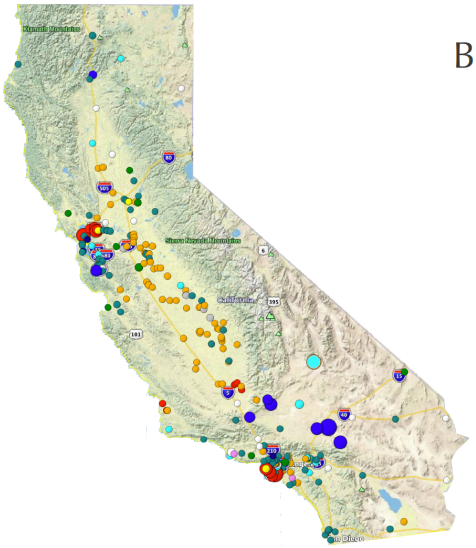
The benefits of replacing fossil fuel fired steam generation with solar electricity has myriad benefits besides the direct GHG benefits. The elimination of criteria pollutants in the San Joaquin Valley is precisely what environmental justice advocates are searching for out of the Scoping Plan and LCFS; very large opportunities are at hand in critically impacted communities.

And the process energy demands for fuel production are large. Very large amounts of low-cost, zero-carbon industrial energy are needed to keep California's economy growing without sacrificing its climate goals. Fossil fuel burning for industrial heat today is significant, (see graphic below) and has been one of the areas previously deemed to be "hard to decarbonize" in the transition to a zero-carbon future. New technology installations driven by the incentives provided by the LCFS will provide the experience base and cost reductions for such technologies to will be used in other sectors. Again, early deployment in LCFS-linked projects will speed and reduce the cost of decarbonizing all California industries.

Rondo is delivering a new tool to decarbonize industrial heat: high-efficiency thermal storage coupled with renewable (wind and solar generated) electricity. Intermittent zero-carbon electricity is now cheaper than burning fossil fuels. The simplest, fastest, cheapest path to industrial decarbonization is "at the source": replace fossil fuel with wind and solar power via technology that removes its intermittency and delivers reliable, continuous high temperature heat that industry requires. Eliminating CO_2 emissions at the source, instead of trying to capture and store them, provides important benefits in certainty, cost, air quality, and speed. Thermal storage technology is available in the timeframe of this LCFS regulatory update, and therefore should be remain eligible as a viable reduction strategy.

[3] https://ww2.arb.ca.gov/sites/default/files/2021-12/LCFS%2012_7%20Workshop%20Presentation.pdf

Statewide, Multi-Industry Impacts



By Industry

• Refining	478 TBtu
• Cement	118 Tbtu
• Hydrogen	48 TBtu
• Metals & minerals	37 Tbtu
• Food & Beverage	35 TBtu
• Manufacturing/Other	31 Tbtu
• Electricity	18 TBtu
• Paper	13 Tbtu
• Glass	9 TBtu
• Cogeneration	1 TBtu
• Biofuel	0.8 TBtu

Industrial heating systems that are indirectly electrified can become large *dispatchable loads* that absorb intermittent peak-hour electricity at very large scale, and serve the very large heating energy needs of industrial facilities with zero-carbon energy as illustrated below. These dispatchable loads and associated renewable generation can provide important flexibility and capacity benefits to the grid as well as CI reductions to fuels.

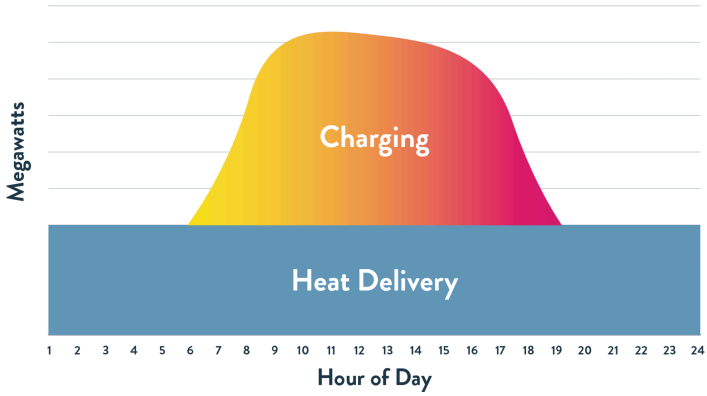


Figure 1 Indirect Electrification: intermittent power to continuous heat

Rondo's technology contribution is a Heat Battery, charged by intermittent renewable electricity, that delivers continuous renewable heat for industrial use. Other technology providers are working on similar approaches to thermal storage of intermittent renewable energy. The Rondo Heat Battery can be charged and discharged an unlimited number of times, powered either by off-grid renewable generation or by the grid, and is designed to serve over 95% of all of California's industrial heat demand for costs significantly below lithium-ion technology.

Renewable thermal heat replaces combustion, meaning these solutions can decarbonize the "hard to get" reductions that have eluded previous planning efforts. And because this technology directly reduces in-basin combustion, the benefits to local air quality – and the impacted communities in which industrial facilities operate – are direct, significant, and permanent.

CARB has rightly recognized the potential benefits of renewable heat in the development of the Low Carbon Fuel Standard in delivering emissions reductions in the production of liquid fuels, placing value on both low-carbon energy for biofuel production and innovative crude production. **Rondo supports retaining and strengthening the LCFS provisions for credit generation for all California liquid fuels.**

Thank you for the opportunity to provide these comments. We look forward to continued discussions.

Sincerely,
/s/

John O'Donnell
CEO, Rondo Energy