Rondo Energy, Inc.
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Deputy Executive Officer
California Air Resources Board

September 3, 2021

Via electronic submittal: Scoping Plan Comment Docket

Re: Rondo Energy Comments on August 17, 2021 Technical Workshop on GHG Scenarios

Rondo Energy appreciates this opportunity to submit comments regarding the 2022 Scoping Plan Update. 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 broader comments to the Kick-Off workshop and incorporates them by reference here[1].

The August 17th workshop broke up the diverse California economy into distinct and separate sectors, many of which CARB has identified as potential candidates for electrification opportunities[2]. As requested by the staff presentation, we respectfully suggest an alternative to direct electrification of these sectors. The GHG modeling necessary to show what can be done policy wise should include evaluation of indirect electrification of industrial heat for several of the sectors highlighted, including fuels, metals, food and beverage, cement, and glass.

Rondo is a California-based company developing and delivering technology that delivers zero-carbon energy for industrial processes and power generation. We see an opportunity to cut the cost of clean energy below the cost of fossil energy, and we see California's policies as critical drivers of the transition to a low-cost, low-carbon future. Therefore, it is critical that such zero-carbon industrial heat, applicable to multiple sectors, be included in the upcoming modeling runs.

It's clear that enormous 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 in past Scoping Plans. This 2022 Update can be different. **This update can realistically include substantial reductions in industrial heat emissions.**

Renewable electric power has now become the lowest-cost source of energy humans have ever known, and will continue to drop in costs for decades to come. Intermittent zero-carbon electricity is now cheaper than burning fossil fuels. If renewable electricity can be harnessed to industrial heating, zero-carbon heat can be lower cost than fossil fuels, creating wealth rather than burden from decarbonization. But converting that intermittent electricity to industrial use has been a challenge. Storing energy as heat is among the most highly efficient processes available, approaching 100% efficiency[3] for heat generated from clean electricity. High-efficiency thermal storage coupled with renewable (wind and solar generated) electricity can be a low-cost source of zero-carbon industrial heat. The simplest, fastest, cheapest path to industrial decarbonization is to replace fossil fuel with wind and solar power via technology that removes its intermittency and delivers reliable, continuous high temperature heat that industry requires. **Thermal storage technology is available in the timeframe of this Scoping Plan Update, and Rondo**

[1] https://www.arb.ca.gov/lists/com-attach/86-sp22-kickoff-ws-ATNdagY3B2NWYAkw.pdf
[2] https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/scoping-plan-meetings-workshops
[3] https://www.sciencedirect.com/topics/engineering/thermal-energy-storage

respectfully suggests that indirect electrification with thermal storage should be included as a viable reduction strategy when conducting the GHG, Air Quality and economic modeling.

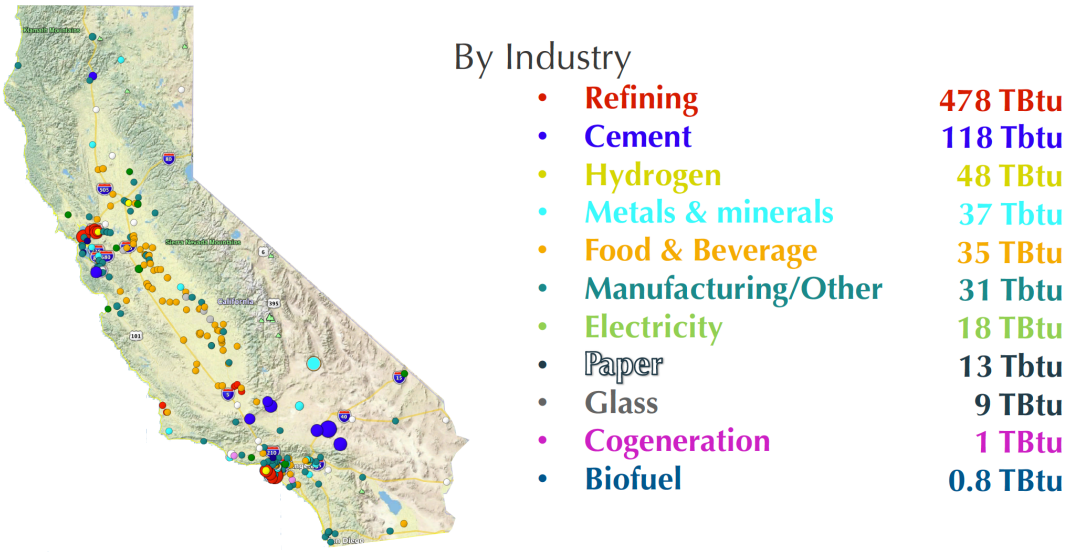

Figure 1 Thermal process energy use by site and sector

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. Such dispatchable loads can provide significant benefits to the grid.

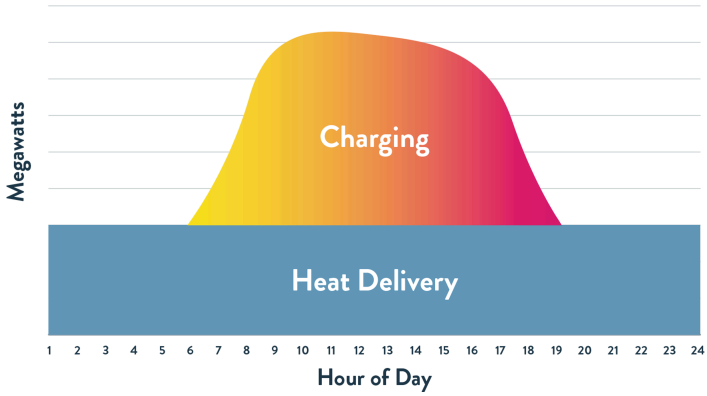

Figure 2 Indirect Electrification: intermittent power to continuous heat

Rondo has developed a new technology – a Heat Battery, charged by intermittent renewable electricity, that delivers continuous renewable heat for industrial use. Other technology providers are working on similar technology. 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 at very low costs.

CARB has previously 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. This limited scope is an example of a

successful policy that is stimulating technology development and market initiatives that will drive down criteria pollutants and carbon emissions at low costs.

Rondo respectfully suggests that a wider look at renewable heat, and its link to 'electrification' and California's future decarbonization goal—both in the electricity sector (zero-carbon grid) and the industrial sector. This Scoping Plan can, and should, highlight the way to drive *decarbonization without deindustrialization* – zero-carbon energy supplies for industrial users that become permanently lower cost than today's carbon-based energy.

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.

We believe the time is now for California to focus on this cross-sector technology, accelerate emissions reductions without increases in cost, and lower criteria and toxic air emissions. It starts with inclusion of zero-carbon industrial heat being modeled, followed by the development of a Renewable Thermal Standard, or RTS, in this Scoping Plan. The inclusion of an RTS would reinforce the signal to the world that California still believes in the power of the aspirational, technology-forcing policy mechanisms. Such actions were a foundation of the original 2008 Scoping Plan. Given the critical and challenging goals of this Carbon Neutrality update, with the readiness of a variety of new renewable thermal technologies, such a policy could be hugely successful in motivating innovation, investment, and industrial growth in the State.

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

Sincerely,
/s/

John O'Donnell
CEO, Rondo Energy