

November 30, 2022

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Via electronic submittal to: [Workshop Comment Docket](#)

Re: Rondo Energy Comments to the Initial Workshop on Net-Zero Emissions Strategy for the Cement Sector

[Rondo Energy, Inc.](#) (“Rondo”) appreciates this opportunity to submit comments regarding the Net-Zero Emissions Strategy for the Cement Sector (the “Strategy”). Rondo strongly supports CARB’s commitment to identify a broad suite of technologies to decarbonize this important economic activity. We also appreciate the opportunity given Rondo to present¹ information that can be used to help lay the groundwork for a robust and workable policy construct.

SB 596 was signed into law in September 2021 and requires CARB, by July 1, 2023, to develop a comprehensive strategy for cement use in California to achieve a GHG intensity 40% below 2019 levels by 2035 and net-zero GHG emissions by 2045. Rondo believes low-cost, zero-carbon heat can play a substantial role in the sector meeting its goal.

As stated by CARB, more cement is used throughout the world each year than any other manufactured material, and intrinsically has one of the highest GHG-intensities. California will continue to rely on cement and concrete to build both the renewable and everyday infrastructure the state needs moving forward, and outlined in the proposed 2022 Scoping Plan Update. Therefore, reducing the GHG-intensity of cement is a crucial piece of overall industrial decarbonization.

Historically, it has been difficult to curb industrial emissions because of a lack of industrial heat solutions that cut across various industries. The emergence of *indirect industrial electrification technologies*, including the Rondo Heat Battery (RHB), provide an immediately feasible, cost-effective, and equitable way to decarbonize across the numerous and diverse industries that collectively contribute to a fifth of California’s GHG emissions. GHG emissions from cement manufacturing are about seven percent of global GHG emissions. The seven cement plants currently operating in California produce over 9 million metric tons of cement per year. In 2019, direct GHG emissions from cement manufacturing in California were 7.8 million metric tons of carbon dioxide equivalent, representing 8.8 percent of industrial sector GHG emissions in California.

Technological Feasibility

Rondo is a California-based company that has developed zero-carbon energy technology for industrial processes decarbonization, including cement manufacturing. The Rondo Heat Battery captures intermittent electricity, stores energy as high-temperature heat, and delivers continuous hot air or steam. When the electricity is renewably-sourced, the outputs become zero-carbon. The RHB is built of widely available, proven, sustainable and durable materials and technologies with 50-100 year life spans. It stores

¹ <https://ww2.arb.ca.gov/sites/default/files/2022-10/nc-SB%20596%20Workshop%20Rondo%20Energy%20Presentation.pdf>

heat energy at temperatures up to 1500°C—enabling use cases ranging from high-temperature steel, cement, and chemical manufacturing all the way to low-temperature food processing. The RHB meets the demanding needs of industry for safe, simple, low-cost energy and economically replaces fuel-fired furnaces and boilers.

Rondo’s first projects with more than ~130MWh of thermal storage capacity are coming online in California within the next year.

Cost-Effectiveness

Indirect industrial electrification is already economical for industry today. And, fundamentally, indirect industrial electrification technologies are more efficient and cost-effective than current zero-carbon alternatives. The RHB has a 98% thermal efficiency—as in 98% of the electrical energy that is used to charge the heat battery is stored and produced in the form of hot air or steam.

Equity

Indirect industrial electrification technologies also provide a more equitable solution to achieving carbon neutrality. Traditionally, lower-income communities and communities of color have borne the disproportionate impact of industrial pollutants; by obviating the need for fuel-fired furnaces and cement kilns. A heat battery not only reduces GHG emissions, but also the local air pollutants associated with the combusting fossil fuels—all without risking the industrial jobs such communities depend on. For example, the Rondo Heat Battery will unlock economical industrial electrification in communities that already suffer from poor air quality.

Ambitious Industrial Emissions Reductions is Possible Now

The recent workshop highlighted various technologies that can aid in Net-Zero Cement, including Carbon Capture and Storage (CCS), alternative clinker and direct electrification as shown on slide 28². Though these emissions reduction technologies are an important tool in the climate action toolbox, the current focus on such technologies risks action that is unnecessarily backloaded and costly. For example, carbon capture costs more than 10x as much per ton of carbon eliminated as indirect industrial electrification with a Rondo Heat Battery. We request that CARB consider early regulatory or incentive actions with these new reduction technologies.

Sector-Specific Comments

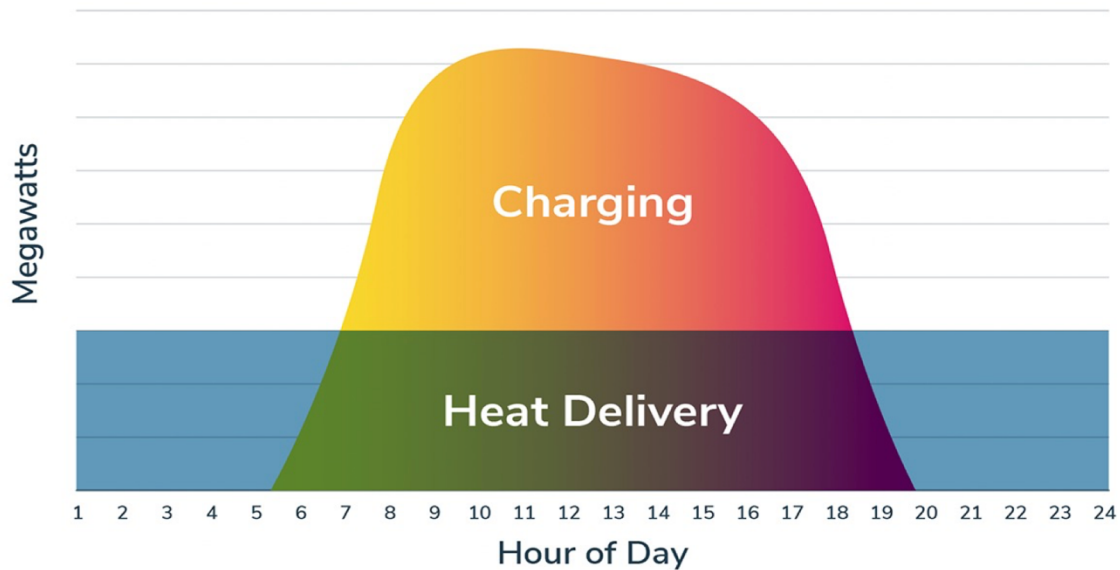
Rondo can be a major contributor to the decarbonization of cement in California. Rondo’s heat battery technology can provide zero-carbon heat and electricity for materials drying, calcination, and eventually full electrification of the cement production process. Additionally, Rondo’s system can be used for production of supplemental cementitious materials such as calcined clay. In April, Rondo announced our EcoClay³ partnership with the Danish government and the Danish engineering firm FLSmidth. Rondo

² <https://ww2.arb.ca.gov/sites/default/files/2022-10/nc-SB%20596%20Kick-Off%20Workshop%20CARB%20Staff%20Presentation.pdf>

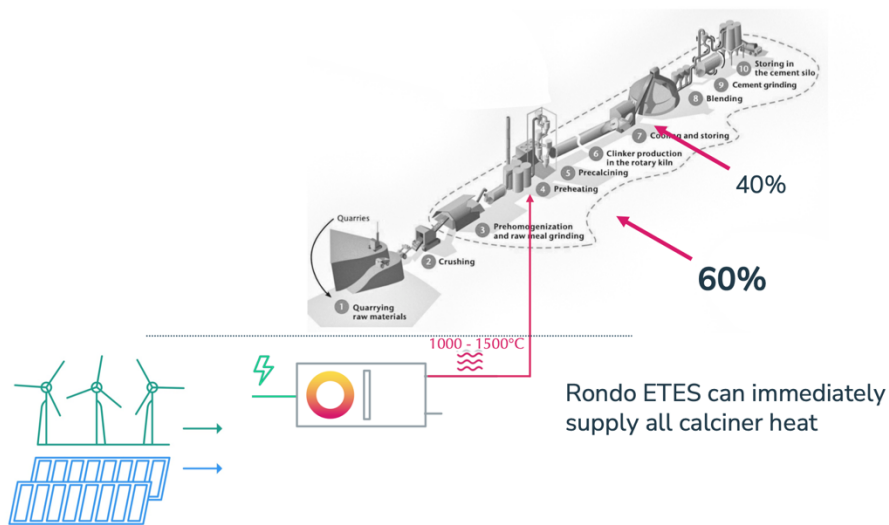
³ <https://www.globenewswire.com/en/news-release/2022/04/27/2429805/0/en/New-cement-partnership-to-eliminate-fossil-fuels-by-electrifying-clay-calcination.html>



has strategic partnerships in place with global cement companies TITAN Cement Group⁴ and Siam Cement Group (SCG)⁵, as well as open discussions with some of California’s cement producers.



Pyroprocessing heat breakdown



Example plant. Rondo patents issued and pending including CO2 superheat cycle.
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Conclusion

California can achieve significant industrial emissions reductions with indirect industrial electrification technologies that already exist, specifically in the cement sector. With a greater focus on

⁴ <https://www.businesswire.com/news/home/20220713005147/en/TITAN-Cement-Group-Joins-Breakthrough-Energy-Ventures-and-Energy-Impact-Partners-to-Scale-Rondo-Energy%E2%80%99s-Industrial-Decarbonization-Technology>

⁵ <https://www.businesswire.com/news/home/20220928005093/en/Siam-Cement-Group-and-Rondo-Energy-Announce-Investment-and-Plan-Partnership-to-Bring-Zero-Carbon-Heat-to-New-Industries-and-New-Territories>

industrial emissions, CARB can use this process to guide California in kickstarting a new wave of industrial decarbonization that can immediately reduce GHG emissions and local air pollutants in a technologically feasible, cost-effective and equity-focused way not just in California, but worldwide, with California leading the way.

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

Sincerely,

/s/

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CEO

Cc: Rajinder Sahota
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