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On Lithium Workshop

Additional submitted attachment is included below.

December 5, 2018

Commissioner Hochschild
California Energy Commission
1516 9th St
Sacramento, CA 95814

RE: Lithium Workshop – Establishing a Lithium Extraction Technology Testbed

Dear Commissioner,

We would like to express our appreciation to you and the staff of the California Energy Commission for the timely hosting of a very successful Workshop on Lithium Recovery from Geothermal Brine, and add our comments regarding the tremendous potential of this resource to aid the State of California in increasing the use of renewable energy resources, reducing Greenhouse Gas Emissions (GHG), and enhancing the energy security of the State and our nation.

The workshop included participants from the Salton Sea Geothermal Field power generation industry, Imperial Valley, California and Federal governmental agencies, academia, national laboratories and industry providers. The participants concluded that the establishment of a lithium extraction demonstration facility was essential for successful development and refinement of a technically viable and cost-effective method for extracting lithium from geothermal brine. We wholeheartedly agree and have already envisioned such a facility in our proposal to the State of California Climate Change Research Program Round 2 Fiscal Year 2018-2019 Program Solicitation[1], entitled ***Reducing GHG Emissions by Making Geothermal Power More Competitive, While Providing Low-cost District Cooling/Heating to Disadvantaged Communities in the Imperial Valley***[2]. Our proposal would not only establish a **Lithium Extraction Development Hub** for extraction of lithium, manganese and other commercially valuable metals and minerals, but also provide a field laboratory to develop and enhance multiple uses of geothermal energy, including the production of hydrogen as a method of storing and transporting geothermal energy as a clean, renewable fuel source, desalination and purification of water using geothermal energy (a potentially critical feature of Salton Sea Restoration[3]), and innovative uses of waste heat for use in domestic cooling and agricultural chillers in the desert environment. A schematic diagram of a possible layout for our proposed facility is shown in Figure 1.

[1] http://sgc.ca.gov/programs/climate-research/docs/20181026-CCRP_Round_2_Solicitation.pdf
[2] Principal Investigator: Wilfred A. Elders, Dept. of Earth Sciences, University of California, Riverside, CA 92521. (elders@ucr.edu); Co-Investigators: Arun Raju, CE-CERT, University of California, Riverside (arun@engr.ucr.edu) Alfredo Martinez-Morales, CE-CERT, University of California, Riverside (alfmart@ece.ucr.edu); Subrecipient: William L. Osborn, Geothermal Solutions (will.osborn09@gmail.com)
[3] https://water.ca.gov/saltonsea/

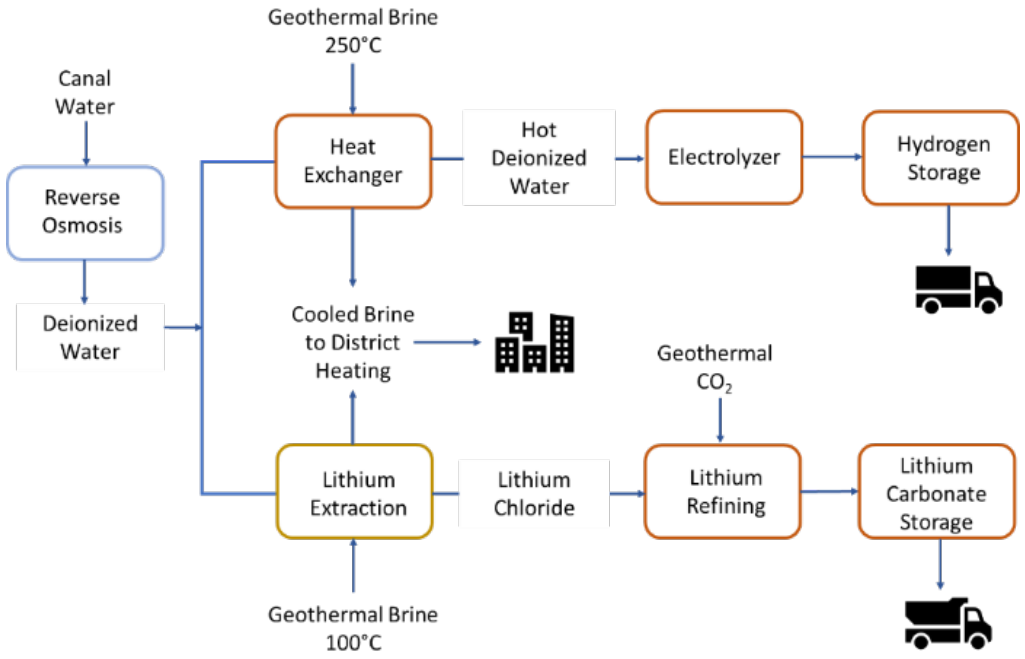

Figure 1. Conceptual design of a development and demonstration facility for the innovative uses of geothermal energy.

The Salton Sea Geothermal Field currently produces about 440 MW_e of clean, renewable, baseload electrical power generation. However, this is a small fraction of the tremendous potential of this natural resource; the Salton Sea Geothermal Field is arguably the single largest underdeveloped geothermal field in the world and has the potential to not only generate as much as 3 GW_e electricity, if suitable power purchase agreements were available. However, as was pointed out in the Workshop on Lithium Extraction, the Salton Sea Geothermal Field is unique in containing extremely large quantities of metals and compounds with potential revenues of tens of billions of dollars annually. However, current operations the Salton Sea Geothermal Field are not conducive to the development of innovative technologies for the use of geothermal energy. The power generation companies operating at the Salton Sea are focused on power generation revenue and have only limited capability to perform complex research in hypersaline geothermal brines. In addition, competitive corporate strategies limit information sharing and access to the geothermal brine. Several entities are interested in metal extraction from these brines and various claims of success have been made, without any documentation appearing in the public domain.

Successful development of the necessary technology requires direct access to the hot, hypersaline brine in a field laboratory; using preserved samples or synthetic brine in remote laboratories is not effective due to the chemical instability of the brine. Our proposed **Lithium Development Testbed** is designed to provide on-site access to actual hot brine in a field laboratory that is open to all qualified researchers and developers. A first step in establishing the **Testbed** would be the establishment of a legal framework the would identify the site host, establish data sharing rights, and ensure access to developed and demonstrated technologies so that all geothermal operators in the Imperial Valley can benefit, while protecting their proprietary rights.

We ask that the California Energy Commission strongly consider participating in the establishment of our proposed Lithium Development Testbed, which would help to develop the great potential of the Salton

Sea geothermal resource, establish California as a leader in lithium extraction, hydrogen production and other innovative energy technologies, and help the State of California reach its goal of 100% zero-carbon electricity by 2045. We look forward to discussing this opportunity with your staff.

Sincerely,

Dr. Wilfred Elders

Professor Emeritus, University of California at Riverside

William Osborn

President, Geothermal Solutions Inc.