

## Proposed Agreement between California Energy Commission and Simbol, Inc.

**Title:** Potassium Production from Geothermal Brines in California  
**Amount:** \$949,545.00  
**Term:** 33 months  
**Contact:** Pablo Gutierrez  
**Committee Meeting:** 5/10/2011

### Funding

FY	Program	Area	Initiative	Budget	This Project	Remaining Balance	
09	Geothermal	Renewables	Geothermal	\$4,500,000	\$157,680	\$0	0%
10	Geothermal	Renewables	Geothermal	\$1,150,000	\$791,865	\$158,135	14%

### Recommendation

Approve this agreement with Simbol, Inc. for \$949,545.00. Staff recommends placing this item on the discussion agenda of the Commission Business Meeting.

### Issue

No technologies for economically producing potassium and producing a commercial product such as potash have been developed for the geothermal brines in the Salton Sea geothermal field even though the field has the potential to be the largest potassium resource in the U.S. Potassium was extracted from brines in the Imperial Valley but the evaporation process used proved to be uneconomic and operations ceased. The tremendous economic benefits of California's potassium resource in its geothermal brines cannot be realized until these technologies are developed and demonstrated in the field, and proven to be commercially viable.

### Background

More than 90% of the world's potassium supply is used to make fertilizer-related products such as potash, potassium nitrate, and potassium magnesium sulfate. The total global consumption of potassium fertilizer (95% KCl, 5% K<sub>2</sub>SO<sub>4</sub>) is about 32 million tonnes per year. The fertilizer and chemical industry use potash as their primary source of potassium. Potassium is essential to plant life; there is no known substitute. Potassium produces higher crop yields and improved plant quality. The need to increase crop yields is gaining in importance as the world's population increases yet arable land is lost. The overall U.S. market demand for potash is 7.7 million tonnes, of which 6.5 million tonnes is imported from Canada. The value of total U.S. annual potash consumption is ~\$3.9 billion at the 2010 price of \$500/tonne. The U.S. is currently the world's leading importer of potash, which offers a great opportunity to meet that unmet demand. Output from the power plants existing and under construction in the Salton Sea field would be 3.1 million tonnes.

### Proposed Work

This Agreement will demonstrate that a marketable potassium product can be produced economically from Salton Sea geothermal brines. The goal will be met by continuous operation of a potash demonstration plant using live geothermal brine. Commercial extraction of potassium will increase the

value of geothermal resources and increase the cash flow to geothermal operators, thereby accelerating the development of California's geothermal resources, especially in Imperial County.

The Agreement will develop one or more processes that will extract at least 50% of the potassium in geothermal brines and convert the potassium to potash that meets market specifications at a cost that is competitive with the low cost producers of potash. To meet these objectives, Simbol will first develop processes for potassium extraction in the laboratory, conduct laboratory pilot testing of the best technologies, and produce samples of potash for market qualification at a demonstration plant to be located at Simbol's commercial lithium extraction plant, using feed brine from a geothermal power plant in the Salton Sea geothermal field.

### **Justification and Goals**

This project Public Resources Code Chapter 6, Disposition of Geothermal Revenues, Sections 3800 through 3823.

This project also addresses edit to insert legislative text or other optional text if desired

This will be accomplished by:

- The goal of this Agreement is to demonstrate that a marketable potassium product can be produced economically from Salton Sea geothermal brines.