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*Comment Received From: William Pettitt*
*Submitted On: 7/12/2019*
*Docket Number: 19-ERDD-01*

## Comments from the Geothermal Resources Council (GRC)

Please find attached a PDF containing comments submitted in response to the CEC â€œRequest for Public Comments on the Preliminary Draft Research Roadmapâ€□. Sincerely, Will Pettitt, PhD (Executive Director)

*Additional submitted attachment is included below.*

July 12, 2019

Dear sirs,

**RE: 19-ERDD-01 – "Preliminary Draft Utility Scale Renewable Energy Generation Research Roadmap" – TN# 228863**

In response to the California Energy Commission (CEC) "Request for Public Comments on the Preliminary Draft Research Roadmap", I kindly request that you consider the following comments from the Geothermal Resources Council (GRC).

The comments relate to Section 7, Geothermal Research Roadmap. Specifically, Section 7.2 provides two initiatives that are worthy of funding opportunities and we commend and thank the team for developing these initiatives. We recommend that these initiatives be expanded with three additional "Recommended Initiatives" at this time.

1) Mineral recovery from geothermal brines (especially Lithium in today's market) should be considered as a key research topic. Geothermal brines from the Salton Seas area provide a readily available resource of minerals that are not currently being utilized for that purpose. The market for lithium is expected to significantly increase over the coming years and decades with the expansion of battery driven transport. Recovery of the lithium resource in tandem with geothermal power production will lead to major cost efficiencies for both the mineral extraction and power production that significantly reduces the overall supply cost of the geothermal electricity generation. It will also significantly reduce the overall risk profile of geothermal projects and facilitate investment in resource development in a geographical area that is rich in geothermal resources.

2) Performing research that encourages investment in geothermal power projects should be high priority. Research that facilitates a lowering of the risk profile is therefore critical. As the authors correctly describe, drilling is a major capital cost component for developing a project and has risks associated with developing non-productive wells. Research initiatives should be considered that reduce the cost of drilling and completing geothermal wells and thus reduce the barriers to entry for potential investors by reducing project risk profiles. Drilling and completion research can focus on many areas including, but not limited to: the crossover of drill-bit technologies from oil & gas to higher-temperature, higher-strength rocks,

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to facilitate higher penetration rates for geothermal drilling; cementing in high temperature environments to ensure greater well bore stability for geothermal wells etc.

3) The Department of Energy (DOE) has performed a highly successful research initiative for geothermal resource exploration and evaluation in recent years called Play Fairway Analysis[1] based on experience from the oil & gas industry. It is well known that California has large undeveloped geothermal resources. The extension of the limited project scopes performed by the DOE to areas of California would greatly benefit the development of resources in the State. The recent decision by the California Public Utilities Commission (CPUC) for 1,700 MW of new geothermal net capacity by 2030 means an effective doubling of today's installed capacity in the next decade. A funding initiative for research projects that utilize Play Fairway Analysis would encourage investment in geothermal projects by providing greater certainty of resource locations and predicted generation capacity.

I humbly submit these comments and hope the authors will consider adding these research initiatives to the CEC's timely and important research funding opportunities. I greatly appreciate and thank the CEC for their leadership on these matters.

The GRC is a non-profit professional association for the geothermal industry and community in the USA and abroad. We were founded in 1972 and are headquartered in Davis, California. We have over 1,300 members from around the world and are working to advance our industry by supporting the development of geothermal energy resources through communication of robust research, knowledge and guidance.

We thank you for your consideration. I am available to answer questions and discuss further at your convenience.

Respectfully,

Will Pettitt, PhD
GRC Executive Director
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[1] https://www.energy.gov/eere/geothermal/play-fairway-analysis