

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements.	Rulemaking 16-02-007 (Filed February 11, 2016)
---	---

**COMMENTS OF THE GEOTHERMAL RESOURCE COUNCIL ON ALJ RULING  
SEEKING COMMENT ON PROPOSED REFERENCE SYSTEM PORTFOLIO AND  
RELATED POLICY ACTIONS**

\_ /s/ WILL PETTITT  
Will Pettitt  
Executive Director  
Geothermal Resource Council  
P.O. Box 1350  
Davis, CA 95617  
Phone: 651-808-4463  
Email: [wpettitt@geothermal.org](mailto:wpettitt@geothermal.org)

Dated: December 17, 2019

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Develop an Electricity Integrated Resource Planning Framework and to Coordinate and Refine Long-Term Procurement Planning Requirements.	Rulemaking 16-02-007 (Filed February 11, 2016)
---	---

**COMMENTS OF THE GEOTHERMAL RESOURCE COUNCIL ON ALJ RULING  
SEEKING COMMENT ON PROPOSED REFERENCE SYSTEM PORTFOLIO AND  
RELATED POLICY ACTIONS**

**1. INTRODUCTION**

In accordance with the Administrative Law Judge’s Ruling seeking comment on the Energy Division’s proposed Reference System Plan to be used in the development of the 2019-2020 individual Integrated Resource Plans scheduled to be filed by load-serving entities(LSEs) on May 1, 2020, The Geothermal Resource Council (GRC) hereby submits these comments. The GRC is a tax-exempt, non-profit, educational association 501(c)(3). Formed in 1970, the GRC was incorporated in the state of Washington in 1972 and in California in 1981. The GRC actively seeks to expand its role as a primary professional educational association for the international geothermal community. The GRC serves as a focal point for continuing professional development for its members through its outreach, information transfer and education services.

**II. GENERAL COMMENTS**

The Energy Division’s Reference System Plan (RSP) is intended to serve as a benchmark, providing guidance for the development of individual LSE plans to meet 2030 Greenhouse Gas (GHG) emissions targets, consider requirements for 2045, and to provide a base case for the CAISO’s Transmission Planning Process (TPP). Development of the plan relies on the RESOLVE capacity expansion model and a series of assumptions about the performance and

cost of various components to identify an optimal (least cost) resource mix to meet California's 2030 environmental requirements. The draft RSP does not identify any increase in geothermal energy deployment to meet 2030 goals and only a few scenarios include a significant geothermal component. This is a questionable result in light of the fact that geothermal is a proven baseload renewable resource that has its greatest potential impact in the Western US. GRC estimates that the overall geothermal potential in Western States exceeds 33,000 MW<sup>1</sup>. GRC encourages the Commission to give additional consideration to the benefits that incremental geothermal development can provide toward meeting California's aggressive GHG reduction goals.

### **III RESPONSES TO QUESTIONS**

#### **1. Please provide any comments on the use of the RESOLVE model;**

The Commission has been relying on the RESOLVE model to serve as the basis for guiding optimal resource development to achieve California's climate goals. While RESOLVE is able to develop portfolios that meet the requirements, it is but a forecasting tool. As such, it is highly dependent on the assumptions it contains and may fail to capture the impacts of the unforeseen on what constitutes future resource decisions. As a result, GRC encourages the Commission to look at RESOLVE results as instructive but not obligatory. LSEs may be more likely to make procurement decisions that provide more resource diversity than might come out of RESOLVE.

#### **2. Provide any comments on the use of SERVIM**

GRC does not have comments on SERVIM at this time.

#### **3. Provide any comments on baseline assumptions;**

GRC strongly supports development of more diverse portfolios through sensitivity analysis of various resource assumptions. In particular, GRC members are interested in sensitivities on

---

<sup>1</sup> See <https://geothermal.org/states.html>

lower geothermal installed costs to reflect their actual project and contractual experiences and to indicate which price points will allow different geothermal technologies to enter the resource planning solution over time.

**7. Provide any comments on the results from the major scenarios or sensitivities analyzed by Commission staff to develop the RSP recommendation.**

GRC is concerned that this version of the RESOLVE assumptions and scenarios did not result in as much selection of geothermal as the prior assumptions and scenarios.

The western United States is a region rich in geothermal resources. Maximum geothermal resource potential, using existing technologies, is calculated at nearly 13 GW by NREL<sup>2</sup> and over 33 GW in GRC's assessment. While there are well-known challenges to resource development, there are also continuous research and commercial initiatives to access the resource at reasonable cost.

**8. Comment on the modifications to SERVIM made by Commission staff to approximate RESOLVE's PRM constraint, which limits the amount of imports that can count towards resource adequacy. Were the changes appropriate? Why or why not?**

No comment at this time

**11. Are you concerned about the risk of overreliance on solar as part of the recommended portfolio? Why or why not?**

While solar plus storage appear to be an inexpensive option, over-reliance on a single option is likely to create environment and land use concerns that would not be an issue with a more diverse portfolio.

---

<sup>2</sup> NREL Geovision Report: <https://www.energy.gov/eere/geothermal/downloads/geovision-harnessing-heat-beneath-our-feet>

**12. Are you concerned about the risk of overreliance on battery storage as part of the recommended portfolio? Why or why not?**

The same concerns identified for solar apply to storage. Over-reliance on any single technology is inconsistent with developing a diverse portfolio and could expose California to unforeseen risks to reliability. A critical further consideration is that most of the current projects in the CAISO queue are solar with integrated battery storage (or vice-versa), and hence for many of these plants, notably those in which the storage charges only from the solar field, the capacity factor of the hybrid resource will be contingent on the weather. While the sun may rise and set on a predictable basis, extended periods of winter cloudiness can quickly exceed the four-hours of storage typically provided by battery storage.

**15. Should the Commission take steps to begin development of transmission and/or generation from geothermal resource areas? If so, what steps? If not, why not?**

For the sake of a more diverse resource portfolio, GRC recommends that the Commission assess the steps needed to identify and access potential geothermal resource locations. To that end, the GRC report referenced<sup>3</sup> in question 1 could provide a useful source of information. The NREL GeoVision Report<sup>4</sup> also provides a good reference.

**17. Are there other actions the Commission should take specifically with respect to replacement capacity for the Diablo Canyon nuclear plant? Describe in detail.**

Retirement of Diablo Canyon will remove over 2,000 MW of baseload carbon-neutral generation from California's resource inventory, and we support replacement of at least some of that capacity with carbon-neutral flexible base-load alternatives such as geothermal.

---

<sup>3</sup> <https://geothermal.org/states.html>

<sup>4</sup> <https://www.energy.gov/eere/geothermal/geovision>

**20. Comment on the recommendations for policy-driven sensitivities around curtailment in particular transmission zones and the associated impact on EO or full deliverability for renewables.**

Considering the already steep decline in the capacity value of solar, and the potential for declines in the capacity value of battery storage as penetration increases, favoring more stable capacity resources like geothermal in deliverability assessment would provide more potential renewable energy per unit of reserved capacity and better utilize incremental transmission deliverability. Geothermal has many years of performance with consistently high capacity ratings, and this will continue into the future.

**24. What criteria should Commission staff use to determine whether transmission upgrade needs identified by LSEs in their IRPs are appropriate to be reflected in the PSP and the TPP reliability base case adopted by the Commission?**

Transmission upgrade needs identified in LSE plans should be incorporated into the PSP as alternative solutions and flagged in the TPP base case for further evaluation.

**IV. CONCLUSION**

Because of its ability to provide carbon-neutral baseload renewable generation in fairly compact increments, California should consider a targeted approach to geothermal in resource planning. Geothermal can provide flexible, high capacity-factor renewable generation to support a fully carbon neutral grid. GRC appreciates that the CPUC has a complex task in developing least cost resource portfolios for California which lead to decarbonization over just the next 10-25 years. Based on the prior IRP proceeding, we see the risk that the CPUC will default to a recommendation for zero MW of new geothermal by 2030, reflecting the current levels selected in the scenario proposed as the RSP, and this may be the conclusion drawn from the other base

results from the 46 MMT, 38 MMT and 30 MMT scenarios at the assumed installed geothermal costs. In contrast, RESOLVE does select the maximum geothermal available in the modeled resource potential (around 2.3 GW) in many 2045 scenarios, which do capture the benefits of the resource in higher decarbonization cases. In addition, at lower geothermal installed costs reflecting recent contracts, RESOLVE does typically select more geothermal, and sometimes a lot more. Our conclusion is that RESOLVE is a detailed but still highly simplified modeling tool; over the past few years it has generated a wide range of results, from low to high geothermal selection. We urge the Commission not to take this path of zero or very low geothermal selection which could adversely affect geothermal development, commercial prospects and technology innovation. Geothermal is a high quality renewable resource which has provided much more reliable service to the California power system than any other renewable or hydro resource.

We note that, notwithstanding the current results of RESOLVE runs, IRPs from jurisdictional entities which favor new geothermal (such as the 2018 IRPs from SCE and Clean Power Alliance), and the review of the current analysis conducted so far, we believe that the Commission should consider a minimum selection of geothermal of 1.5 GW by 2030. This target reflects additional benefits not currently considered, such as which would come from the much lower land use per MWh of clean energy, higher resilience of the power system, and resource diversity. There are currently limits to how much geothermal can be developed cost-effectively, and hence there will still be massive procurement of solar PV, wind and batteries regardless of the geothermal expansion. However, as with any resource, geothermal requires a level playing field which is not currently being provided in the IRP process, as demonstrated by

the wide variation in results from different IRPs using different methods as well as from the RESOLVE model itself.

GRC appreciates the opportunity to provide these comments and supports the development of a vibrant and viable IRP portfolio development process.

Respectfully submitted,

**By: /s/ WILL PETTIT**

Will Pettitt  
Executive Director  
Geothermal Resource Council  
P.O. Box 1350  
Davis, CA 95617  
Phone: 651-808-4463  
Email: [wpettitt@geothermal.org](mailto:wpettitt@geothermal.org)