

**DOCKETED**

<b>Docket Number:</b>	19-ERDD-01
<b>Project Title:</b>	Research Idea Exchange
<b>TN #:</b>	231333
<b>Document Title:</b>	Eagle Rock Analytics Comments - Re Request for Comments on Forthcoming Solicitation Regarding Climate Scenarios and Analyses
<b>Description:</b>	N/A
<b>Filer:</b>	System
<b>Organization:</b>	Eagle Rock Analytics/Owen Doherty
<b>Submitter Role:</b>	Public
<b>Submission Date:</b>	12/28/2019 1:02:40 PM
<b>Docketed Date:</b>	12/30/2019

*Comment Received From: Owen Doherty*  
*Submitted On: 12/28/2019*  
*Docket Number: 19-ERDD-01*

**Re Request for Comments on Forthcoming Solicitation Regarding Climate Scenarios and Analyses**

*Additional submitted attachment is included below.*



**Eagle Rock Analytics**

**3669 57<sup>th</sup> Street**

**Sacramento, CA**

[owen@eaglerockanalytics.com](mailto:owen@eaglerockanalytics.com) or (631)-766-7406

December 24, 2019

Comments from Eagle Rock Analytics

Re: Request for Comments on Forthcoming Solicitation Regarding Climate Scenarios and Analyses

Docket #: 19-ERDD-01

Dear Dr. Schmidt-Poolman,

Thank you for the opportunity and invitation to comment on the Forthcoming Solicitation Regarding Climate Scenarios and Analyses. The California Energy Commission's position as a leader on planning for climate change is augmented and strengthened by its continual engagement of researchers and stakeholders. Such frequent engagements ensure that research of the highest caliber and greatest relevance is supported. In our comments below we address some of the Commission's eight questions listed in the workshop notice, as well as recognize Commission leadership in the space, and offer an additional comment on the suitability of proposed level of funding and mechanisms for funding for consideration.

### **In Recognition of State Leadership**

The Energy Commission's leadership on and support for resilience planning needs to be lauded and acknowledged. At the 2019 AGU Fall Meeting, Commission staff were invited to present an overview of State efforts building energy system resilience to climate change. Lessons learned from the 4<sup>th</sup> Assessment, as well as anticipated approaches to the 5<sup>th</sup> Assessment and engagement with the international scientific community, and invitations extended to this community to engage in the 5<sup>th</sup> Assessment. Further, it is our understanding that leadership in the National Climate Assessment have reached out to the Commission to collaborate and leverage resources. The public record should accurately reflect the international and national recognition of the efforts of the Energy Commission to co-lead the 4<sup>th</sup> Assessment and to plan for the 5<sup>th</sup> Assessment. The forthcoming solicitation, that this workshop and request for comments is predicated on, will further cement the leadership role of the Commission. Said leadership is critical for positioning the State to begin to develop resilience to climate change, and directly benefit ratepayers through improvements in energy sector resilience, reliability and safety.

### **On the Suitability of Proposed Level of Funding and Mechanisms for Funding**

Here the Energy Commission dramatically expands the scope and effort of climate modeling and visualization, while reducing total overall support from historical funding levels. The Energy Commission should reconsider and reduce the scope and aims that could be supported at the anticipated funding level of \$3 million. Presently the visualization platform (Cal-Adapt) is supported at a level of \$2.1 million, while it is anticipated that in the future visualization is just 1 of 5 key pillars of the anticipated project. It's reasonable to expect roughly a 3-fold increase in the spatial resolution, a 12-to-24-fold increase in the temporal resolution (daily to hourly) and a yet unknown increase in the numbers of

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## Eagle Rock Analytics

3669 57<sup>th</sup> Street

Sacramento, CA

[owen@eaglerockanalytics.com](mailto:owen@eaglerockanalytics.com) or (631)-766-7406

variables served. In the cloud, computing is cheap but storage (and transfer) of data is expensive, and the requirements for storage will increase by an order of magnitude or more as we move from CMIP5 to CMIP6. Barring improvements in visualization and tool-building efficiency, it might be reasonable to expect the visualization costs to increase in the future, rather than decrease. Likewise – the demands on a downscaling effort are expected to be similarly increased. Vigorous stakeholder engagement and a novel (and critically important) data analytics component of the work represent new, and potentially expensive components that require support, which is not reasonable to expect within this proposed budget.

The Energy Commission might anticipate that the aggregate cost of downscaling, analyzing, visualizing, managing and engaging in vigorous outreach to more reasonably cost \$8 million to \$11 million.

Ratepayer benefits would be maximized if various sources of State funding could be combined into one award. It's not unreasonable to expect funding to come from EPIC, natural-gas research program, SGC and potentially other state agencies. Each individual award will require administrative effort (and cost), both to Recipients and to the State. We argue that time and effort spent managing the award will increase with each funding source, and overall project focus will be reduced if attention is spread out over independent multiple agencies. To maximize ratepayer benefits, the Energy Commission should consider a grand award spanning multiple state agencies to minimize overhead costs and enhance opportunities for collaboration.

### **Responses to Questions: Organizational Questions**

*1. What factors should be considered in the decision of whether to fund one single effort or two smaller efforts?*

Ideally, applicants would have the option to submit proposals that address either or both individual projects. The benefits from such an approach are two-way: (1) smaller teams that are strong at a subset of tasks would be encouraged to apply and (2) the Energy Commission would be able to mix and match the teams that best meet their needs. Presenting multiple application options will increase the number of Applicants, heighten the competitiveness of solicitations, and therefore benefit ratepayers.

*2. How can we explicitly incentivize the role of strong project management to ensure strong internal coordination (and coordination between grants, if two grants are funded) and successful design, application, and stakeholder adoption of data products?*

Strong project management, with vigorous continuous stakeholder engagement is labor intensive, yet historically EPIC solicitations do not award efficient management and engagement, rather technical (i.e. research) tasks are weighed more. The expectations and high requirements associated with this forthcoming solicitation should be reflected in the wording of the "Technical Approach." If project management and coordination is critical expectations should be called out with wording as extensive and rigorous as the scientific and technical tasks (and explicitly noted as such).

The Energy Commission is in effect transferring a large degree of project management from Staff to Recipients, as historically each of the five tasks in this forthcoming solicitation may have been its own



## Eagle Rock Analytics

3669 57<sup>th</sup> Street

Sacramento, CA

[owen@eaglerockanalytics.com](mailto:owen@eaglerockanalytics.com) or (631)-766-7406

individual project. The Energy Commission should therefore expect a corresponding increase in the cost of management for the project. Earlier we noted that \$3 million represents a decline in fiscal support relative to the 4<sup>th</sup> Assessment – increased project management should be reflected in increases to potential budgets.

### Responses to Questions: Scope Questions

*3. EPIC has funded an ongoing project (EPC-16-063) to develop hybrid downscaling methodologies, but the current GFO does not require that methodology to be used for the Fifth Assessment. What criteria or metrics should the GFO identify for evaluating applicants' proposed downscaling methods?*

We urge the Energy Commission to open their current efforts supporting downscaling research to the public. If it is the intention of the Energy Commission to hold a competitive solicitation, applicants need to have an opportunity to understand the methods developed in support of EPC-16-036, the so-called hybrid downscaling development project. It's reasonable to expect that results from, or lessons learned from the work will be applicable to downscaling efforts in support of the Fifth Assessment. In order of utility to applicants:

- Code made open source and accessible to applicants
- Peer reviewed journal article describing methods
- White or grey paper of methods and validation
- Public workshop describing project results
- CEC produced memorandum on "lessons learned" from project

Failure to produce code, documentation, articles with sufficient time (2-3 months lead time) for external review by applicants will have a chilling effect on producing a competitive solicitation call, as Applicants may (wrongly) assume that it is the Commission's intention to continue on a business as usual approach, or worse, Applicants may not be able to incorporate advances from EPC-16-036 into their proposals, reducing the utility of ratepayer funds spent on EPC-16-036.

Open source code repositories are in line with the values and goals of California's State government to have an open and transparent government and allow future recipients to build upon Energy Commission funded works.

*4. Ideally, the project(s) from this GFO will generate priority projections that represent a multiplicity of possible futures and constrain uncertainty by preferential model selection. We would like to open the floor for discussion of this goal and considerations that the GFO language should reflect.*

"Constrain uncertainty" likely indicates a preference for approaches that accurately represent the widest possible cross-section of models, future-scenarios and downscaling techniques; so that decision makers can have a representative range of future outcomes to plan around. However, it's possible that the word "constrain" could be mis-construed as a mandate to reduce uncertainty. While reducing uncertainties from downscaling techniques is a positive, when thinking about a range of future outcomes -- accurately conveying the wide range is a positive.



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**3669 57<sup>th</sup> Street**

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[owen@eaglerockanalytics.com](mailto:owen@eaglerockanalytics.com) or (631)-766-7406

The methods employed (i.e. hot-dry, cold-wet, etc) in the 4<sup>th</sup> Assessment for selecting models trivialized and oversimplified a complex problem: selecting representative models across individual variables and climate regimes. The approach chosen in the 4<sup>th</sup> Assessment likely has resulted in overconfident presentations of future projections of climate. Users of Cal-Adapt often assume that the 10 models selected are “the best” or “endorsed.” This line of thinking has infected third party studies outside of State supported efforts, as non-profits misconstrue and overstate validity of the 10 models selected and ignore critical uncertainties included in the 13 ignored models. Requiring prioritization of GCMs may have been appropriate with 2008 computational resources but given the low cost of cloud-based computing any approach constructed for 2019 should be inclusive of a much wider array of models, experiment designs and ensembles. Benefits to ratepayers would be increased if, in the Solicitation, wording implied that approaches that consider the widest combination of models/scenarios etc., will be scored highly.

The Energy Commission **must** require an analytically driven, peer-review supported approach to weighing or otherwise combining CMIP6 projections in manner that accurately passes along uncertainties into the final value. A discussion of recent progress on the issue, with some good references therein can be seen in [Kaspar-Ott \(2019\)](#) and a review article by [Knutti et al \(2017\)](#).

While presenting downscaled versions of every ensemble of every GCM in CMIP6 may not be feasible, presenting versions of each model with some proxy of intramodal uncertainty (i.e. via consideration of ensembles) included is becoming more reasonable to consider as cloud computing costs continue to decline. The solicitation should be open to a cutting-edge big-data, heavy computational lifting approach. Forced sub-setting or prioritization of models may not be necessary in 2022, as it was in earlier assessments. Given ever decreasing costs for cloud computing the Energy Commission might reasonably expect Recipients to downscale all models in the CMIP6 repository, for a subset of critical experiments and scenarios. Perhaps instead the onus should be on Applicants to justify their choices to omit models, and on how they will propagate uncertainties from these culled models into their projections?

#### **Responses to Questions: Additional Questions for Consideration**

*5. What ongoing work to cull models contributing to CMIP6 for California should the proposed research be coordinating with? How should the proposed grant be scoped to leverage and coordinate existing or planned efforts?*

As previously referenced, culling models may or may not be necessary depending on the approach taken. One can imagine a situation in which all models are downscaled, and via some analytics, results are presented via Cal-Adapt in a simplified (but rigorous) manner to users. Further, it's not unreasonable to consider the possibility that federal or international efforts may produce regionally downscaled models that are enough to meet stakeholder needs, necessitating a change in prioritization of efforts. As such approaches which are agile and nimble, with teams that are able to adapt to advances that are presently not known, but potentially foreseeable, should be considered favorably by the Commission. This would include some component of engagement with federal and other researchers, with a built in capacity to incorporate external efforts.

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*7. Practitioners of climate change risk management may preferentially use projections that perform well in the historical period for their area of interest, based on available observations.*

*a. Should the Fifth Assessment require bias correction to help meet this desire?*

Historically, even the best performing dynamic downscaling models require bias correction for certain applications (i.e. agricultural and hydrological assessments). However, the State should be method agnostic when considering approaches to the Fifth Assessment and place the onus onto Applicants into asserting that their suggested approach is appropriate – as alternative downscaling techniques are evolving quickly (i.e. [Turco et al 2017](#)). Applicants should have the burden of proof to demonstrate that their proposed methods are most beneficial to ratepayers.

Thank you for the opportunity to provide comments, and for your consideration.

Sincerely,

Owen Doherty

Principal Research Scientist

Eagle Rock Analytics

Sacramento, CA