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Scripps Oceanography- Public Comment on the California Energy Commission's EPIC 5 Draft Initiatives and Research Topics

Additional submitted attachment is included below.

June 24th, 2026

Drew Bohan, Executive Director
California Energy Commission
715 P Street
Sacramento, CA 95814

Subject: Public Comment on the California Energy Commission's EPIC 5 Draft Initiatives and Research Topics

Dear Mr. Bohan,

Thank you for the opportunity to comment on the California Energy Commission's (CEC) EPIC 5 Draft Initiatives and Research Topics. Scripps Institution of Oceanography at UC San Diego climate researchers have enjoyed a longstanding and productive partnership with the CEC to develop innovative methodologies and approaches to downscale global climate models, helping inform state and local adaptation strategies and projects.

Draft Initiative: Scaling DERs and Demand Flexibility as Grid Resources
We appreciate the CEC's efforts to advance distributed energy resources (DER) and load flexibility to improve affordability and grid reliability. A critical component of advancing DER is improved forecasting and the integration of these forecasts into energy system operations. Variables such as solar irradiance, which is affected by cloud cover and winds, affect the renewable production. These variables can be difficult to forecast; thus, efforts to improve these forecasts in a probabilistic framework are fundamental to the success of the initiative. Scripps produces a large ensemble, has a high-resolution ensemble, and is developing a new AI-based forecast ensemble with high regional fidelity. These approaches can be expanded to support DER scaling and demand flexibility.

Draft Initiative: Leading Innovation in Electricity Sector Resilience and Adaptation
We appreciate the climate adaptation focus in EPIC 5, particularly the proposed research to fill critical gaps in climate data and modeling tools to inform grid infrastructure, operational, and adaptation analyses. Through a previously EPIC-funded partnership, Scripps Oceanography researchers led the development of downscaled climate projections to strengthen investor-owned utilities' resilience, inform California Fifth Climate Assessment development, and support adaptation strategies across the state. However, as California experiences the realities of climate change and extreme weather, and global climate models advance, continual investment into downscaling and advancing localized climate projections is necessary for a more resilient energy sector as California moves towards decarbonization.

Some of our still-unsolved, but highest risk questions, in both near and farther term, lie in highly sensitive regions that innately experience high spatial and or temporal changes in climate and weather, and have not been well captured by coarse-scale global models. One critical example involves the fate of our natural shading and air conditioning in California's coastal zone, which grades from a strong marine layer sheltering influence into the drier, hotter interior landscape. The second concerns possible changes in benefits versus treacherous impacts of high wind regimes that set up within and downstream of the topographic gaps in California's hilly and mountain terrain. On one hand, these guide strong spring and summer sea breeze flows to drive vital wind energy generation assets. On the other hand, some of these same features funnel fierce reversed downslope Santa Ana or Diablo winds and attendant fire risk into California residential and commercial communities. The weather patterns that operate in each of these phenomena are, in different ways, spectacular and exquisitely textured in space and time, which partially explains that key variables, like low-level clouds, surface and above-surface winds, have not been systematically observed over a sustained period to provide reliable observational records needed to support vulnerability and mitigation planning.

In our recent CEC-sponsored efforts, we've learned that a fusion of different modeling approaches is needed to tackle these crucial gaps in describing and forecasting climate risk. Thus, to tackle spatially complex, dynamic processes, as described above, must exploit a combination of dynamical downscaling models, one subset being tightly regional (~1 km scale) to capture high gradient, rapid-evolution, high impact features in regions of high interest, plus another subset being a coarser (~10km) nest of dynamic model runs that cover larger geographic domains and handle broader scale drivers and changes that will occur over future decades. The dynamical modeling is costly and produces voluminous output, so it must be applied selectively to build a sample library of historical and future processes and details, but by no means covering the full suite of global model realizations that are needed to evaluate rare extreme events and the different layers of future uncertainty.

To overcome this enormous computational burden, it will then require advances in statistical techniques that can be trained to "learn" these processes. To fill this need, we should call upon a rapidly developing AI/Machine Learning set of modeling techniques that have already demonstrated surprising skill in producing highly detailed, shorter-range weather forecasts in California and other regional domains. These can be trained to supply hourly temporal resolution, high spatial resolution results to support presently identified applications needed by the energy sector and offer the flexibility that will allow them to grow into as yet undetermined spaces in high-resolution regional climate planning. The further evolution of the recent high-resolution reanalysis supported by EPIC would further enable machine learning approaches for forecasting and downscaling. Improving historical weather records, weather forecasts, and climate predictions can help investor-owned utilities prepare for extreme weather and the impacts of climate change.

Thank you for the opportunity to comment. We appreciate the CEC's leadership in advancing innovative and science-based climate solutions, and we look forward to our continued partnership.

Sincerely,

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