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Loren Lutzenhiser comments on solicitation for - Research to Support a Climate-Resilient Transition to a Clean Electric System

Additional submitted attachment is included below.

Docket # 19-ERDD-01 Project Title: Research Idea Exchange

Comments on Forthcoming Solicitation - *Research to Support a Climate-Resilient Transition to a Clean Electric System*

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The proposed Research to Support a *Climate-Resilient Transition to a Clean Electric System* represents very important work to advance SB100's far-sighted climate and energy system resilience goals. It would build on the foundation of past and current EPIC-funded work focused on climate and energy system interactions and the development of decision-support tools for realizing a resilient and more equitable transitioning energy system.

But the California energy system is already in transition in the face of a number of emerging threats and with new technological possibilities. SB100 and a number of other regulatory initiatives aim to influence those transitions. But changes are underway that will shape and constrain future attempts at creating a more resilient and sustainable future energy system and energy-climate interactions. So it is important that the proposed Climate-Resilient Transitions research be conducted rapidly, efficiently and at multiple scales in order to be of most value in efforts to accelerate and guide those transitions.

I would like to make three points that build upon one another. First, we should learn from history about energy system transitions. Second, the demand side is very important and should be seriously considered in a *Climate-Resilient Transition…* research program. Third, within the demand side, inequities are clearly present and will persist and possibly will be exacerbated in alternative …*Clean Electric System* evolutionary trajectories.

1) Learning from Past Energy Transitions

There are a number of widely shared visions of more sustainable and resilient energy system futures that provide guiding technological imagery—for example, the visions of widespread adoption of renewables, decarbonization of energy supplies, distributed energy supply and demand resources, and closer-to-real-time information and control. In studies of technology change these are sometimes called "imaginaries."[1] It is important to pay close attention to what those visions include and what they do not (or what they are blurry about).

[1] For example, see the Harvard Sociotechnical Imaginaries Project and its National Science Foundation funded "Sociotechnical Imaginaries and Science and Technology Policy: A Cross-National Comparison" project (NSF Award No. SES-072413). http://sts.hks.harvard.edu/research/platforms/imaginaries/

So while acknowledging the importance of these envisioned energy system transformations, it is also important to note several lessons we've learned from large scale technological change in the past: (1) the transitions that have actually happened have often not been imagined or were not what had been imagined (e.g., nuclear power), (2) sociotechnical change is rarely uniform, but instead is uneven in adoption, use and impacts (e.g., rural-urban divides in broadband and information access), (3) human elements that may be crucial in change trajectories are too often overlooked by proponents and regulators (e.g., the wide range of "consumer and market barriers" that have been identified over several decades to account for the widely reported "efficiency gap" between engineering estimates and actual energy efficiency uptake and savings, and (4) transitions always come with differential impacts on human populations and social and cultural subgroups (e.g., low-income and disadvantaged communities and exposure to air pollution and toxic hazards; affluent communities and access to high-speed wireless and underground protection of electricity supplies).

2) Demand is as (perhaps more) Important than Supply

Reviewing the Staff Slide Deck from the March 5th workshop and the "Appendix of Draft Solicitation Topics on which Staff is Seeking Feedback"[2] from the workshop notice, we see a broad vision of technical activities and products, primarily focused on environment-energy supply system interactions and involving further modeling of the supply system in various aspects and dynamics. Clearly energy *demand* is an important part of the system and this is acknowledged in several places in the Slide Deck and Appendices. But the role of demand and how it might be incorporated in modeling is not fleshed out and it deserves to be a more prominent focus. Why should this be? If the primary issue is supply stability and resilience in the face of weather extremes, can't demand simply be considered "given" or "constant?" Pointing to lesson #3 above, we ignore the demand side at our peril, and assuming it to be made up of "normal" or "average" patterns of demand as has commonly been done simply adds on a more or less static "black box" versus what is, in reality, quite dynamic.[3] This is likely to be particularly the case in consumer response to heat extremes, heat events, Public Safety Power Shutoffs, wildfire smoke, demand response technologies and programs, peak pricing, and so on. If we don't understand demand-side variability, then the dynamics of demand that an increasingly decentralized and intermittent generation and distribution mix must address remain uncertain. Rather than delaying consideration of detailed demand side dynamics until the next iteration of the research program, it should be addressed in more comprehensive/holistic modeling now.

3) Equity Considerations should be more than Simply a Desirable Quality of Funded Research

In the documents that the Commission staff has presented for feedback, equity is introduced as: "It is also desirable that applicants: • Develop results and products that facilitate these future analyses: Equity implications of concurrent climate and energy

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[2] https://efiling.energy.ca.gov/getdocument.aspx?tn=236715

[3] Lutzenhiser, L., M. Moezzi, A. Ingle, and J. Woods. 2017. *Final Project Report: Advanced Residential Energy and Behavior Analysis Project.* Prepared for the California Energy Commission. CEC-500-2017-029.

system changes over the next 20-30 years (through mid-century)…" Environmental equity and energy equity[4] have often been overlooked in energy and climate policy at all levels of analysis and practice (see lesson #4 above). In a more dynamic and potentially complex, interactive, and networked energy system of distributed energy sources, storage and demand-responsive end-use technologies, income, age, cultural, racial, and geographic inequalities and inequities are probably more likely to be amplified than ameliorated by envisioned sociotechnical transitions. For these reasons, the "equity dimension" should not be allowed to fall through the cracks or be addressed as an afterthought.

[4] Also termed environmental justice, energy poverty, fuel poverty, energy justice by scholars, NGOs, California State agencies, and in the January 2021 naming of the US DOE Deputy Director for Energy Justice.