California Energy Commission
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California Energy Commission
Docket Office , MS-4
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Development of the California Energy Commission Investment Plan for the Electric Program Investment Charge Program (California Energy Commission Docket No. 12-EPIC-01)

For the EPIC program to provide the highest investment on ratepayer funds it is essential that environmental issues related to energy production play a central role in EPIC's plans. The following comments relate to the need for upfront and life-cycle assessments of environmental impacts of renewable energy installations, and identify broad areas of research that would provide insights on these impacts.

The Need for Assessing Environmental Impacts of Renewable Energy Installations:
While renewable energy will assist in the effort to reduce carbon emissions, development of the technology is not without environmental and social concerns (*Boehlert and Bill, 2010* and references therein). For EPIC to develop a robust program that accelerates clean energy innovation and deployment in California, it is important that it is done with an understanding of the potential impacts of renewable energy, and that related environmental effects are suitably addressed. This will lead to improvements in the best practices in the design of utilities, and to better performance standards and monitoring requirements for utility-scale renewable energy-production systems.

While there is a relatively large body of recent literature that has focused on renewable energy technologies, there are very few studies that have explored the related environmental effects (*Gill, 2005*). As a consequence, while in recent years, renewable energy technologies have been rapidly advancing, research related to environmental effects of these technologies is increasingly lagging (*Inger et al., 2009*). The few studies on environmental impacts of renewable energy (e.g., *Tsoutsos et al, 2005*) suggest noise and visual intrusion, water and soil pollution, disruption of archaeological sites and ecosystems; all of which could negatively impact sustained renewable energy production.

Understanding environmental impacts and ecosystem services are critically important for ensuring the success of renewable energy projects over the intended lifespan. Siting these projects in stressed ecosystems makes them vulnerable if natural resources critical for operations become inaccessible. For example, securing water is basic to the feasibility of most renewable energy technologies, and to avoid the risk of curtailed, and/or sustained energy production. Water constraints have already prevented some proposed solar-energy projects from moving forward, while others have undergone modifications to their scale, technology selections, and proposed water source, all at significant costs to project applicants and increased delays in project timelines.

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Project feasibility also depends on environmental mitigations of project impacts such as for water, soil and vegetation loss. Demonstrating the effectiveness of mitigation measures is important to determine whether impact areas and associated mitigation areas are functioning as intended. Environmental monitoring of post-construction restoration prescriptions can provide valuable information about the effectiveness of restoration technologies and validate assumptions about the rate of restoration of biotic components and soil properties. Greater certainty about likely impacts, and the effectiveness of associated mitigation measures, will also allow for more efficient environmental reviews of future projects, and for better anticipation of costs for developers. A program to monitor and assess could also guide projects away from high-conflict areas to areas with reduced environmental impacts.

Assessing Environmental Impacts of Renewable Energy Installations:
To mitigate the uncertainty about the impacts of renewable energy projects on the environment across a range of spatial and temporal scales will require fundamental research and new tools to help inform decision makers. This will involve:

- Mapping the spatial and temporal distribution of resources (e.g. water, solar, biomass, wind etc.) needed for renewable energy production.
- Studying the affect of inter-annual and decadal climate variability on renewable energy resources.
- Improving quantitative forecasting skills for ecological/environmental processes by improving the representation of physical processes.
- Developing a reference database with state-wide information that can be used to evaluate current and future energy resources
- Developing specific pilot studies to improve our fundamental understanding of ecological processes that affect renewable energy production and the local environment.
- Developing and deploying new instruments, observation strategies and data processing and visualization tools.
- Developing tools to evaluate landscapes for optimum renewable energy production on a sustained basis.

It is crucial to the success of the EPIC program that both pre-installation and life-cycle assessments of environmental impacts of renewable energy projects be an integral component of its electricity-related applied research agenda. Developing an understanding of these impacts is important for not only for sustained, long term renewable energy production, but for ensuring the ecological vitality of the landscapes hosting these energy production facilities. An in-depth understanding of these impacts will help further EPICs goals to develop a robust program that accelerates clean energy innovation and deployment in California and is synergistic with other public and private initiatives, while providing high value back to utility customers.

Sincerely,

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References

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