



October 2, 2012

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

RE: Docket No. 12-EPIC-01, Comments on the September 27th Staff Workshop on the First Triennial Investment Plan for the Electric Program Investment Charge Program.

Commissioners and Staff:

We are pleased to have this opportunity to comment on the September 27th Staff Workshop on the First Triennial Investment Plan for the Electric Program Investment Charge Program. We first want to compliment the Energy Commission for producing an outstanding plan. We do, however, have a few suggestions for closing a few possible gaps that we believe we detected in the plan.

We offer these suggestions based on our team's combined experience of many years of closely working with electric grid stakeholders to identify and develop the new technology needed for the California electric grid for the 21st Century, and in the spirit of achieving a program plan and implementation that will result in maximum value to those electric ratepayers providing the funds, and for fulfilling California's environmental and energy policy goals. In making our comments, we generally followed the format as proscribed by the EPIC Investment Plan Workshop Questions and Template distributed at the workshop.

Q.1) Program Scope

Are there proposed initiatives that are too narrow in scope? By contrast, are there proposed initiatives that are too broad in scope? Please indicate which initiative(s) and explain.

Suggestion: While the entire Plan is quite well done, some of its strategies might benefit from additional clarity so that certain important technology developments do not fall through the cracks. This additional clarity and attention to some specifics are especially important since research efforts related to transmission and distribution are not covered by the IOUs' EPIC funds (since they are restricted to Technology Development and Demonstration). While valuable contributions are expected from the IOUs in the areas of testing and demonstrating new hardware, there also remains significant research to be done – for example, in the development of data analytics and algorithms for coordinating and deploying smart grid

devices, especially synchrophasor measurement, which has been a major research success story for the Energy Commission, a story which has not yet reached its full conclusion. Funding these strategic objectives should be a high priority, and an increase of the currently anticipated \$23M in this area might be considered. Some suggested wording changes for this purpose are inserted in a “red Arial” font into language taken from pp. 83-84 of the Plan as shown below.

S6.4 Proposed Funding Initiative: Develop Automation and Operational Practices Including Those for Outage Management, Congestion Mitigation, and Infrastructure Protection to Make Use of Smart Grid Equipment.

Technology Pipeline Stage				Electricity System Value Chain			
Applied R&D and Pilot-scale Testing	Full-scale Demo	Early Deployment	Market Facilitation	Grid Operations/ Market Design	Generation	Transmission/ Distribution	Demand – side Management
X				X	X	X	

Issue: Grid operators lack the proper procedures for handling high penetrations of renewable resources because they do not know what to expect. The variety of characteristics of different types of renewable energy resources increases the complexity of operating the grid, especially as additional resources are connected. It is critical to have a comprehensive understanding of the changes in grid operations needed as penetration of renewable generation increases over time, **as well as increase the capacity of the grid infrastructure.**

Purpose: This initiative will develop automation and operational practices including those for outage management, low system inertia, congestion mitigation, and infrastructure protection to make use of smart grid equipment. Examples of proposed research topics include:

Determining effects on transmission systems from operational changes in the distribution system associated with distributed energy resource integration.

Enabling dynamic thermal ratings for transmission lines to increase load-carrying capacity.

Establishing thresholds for system inertia and frequency response and methods for maintaining those thresholds.

Investigating methods for mitigation of grid instability problems, especially low-frequency oscillations, which limit the power transfer capabilities of the grid.

Investigating methods for sharing multiple resources, such as energy storage, between balancing authorities (California ISO and Bonneville Power Authority).

Developing the science and technology for smart protection systems to reduce the chances and consequences of large cascading outages.

Investigating high-value applications of synchrophasor technology in a variety of potential electric system operations, planning and engineering applications.

Background: Past research has attempted to characterize grid reliability issues such as instability and renewable intermittency, and further research is needed to understand their impacts on the grid. However, there appears to be less research on how to modify grid operations to handle these issues. The traditional approach is to build more infrastructure such as new generators, circuits, and wires, but this approach is no longer sufficient for an observable, controllable, and adaptable grid with high penetrations of renewables.

Energy Commission staff held Technical Advisory Committee (TAC) meetings with the IOUs and the California ISO over the past several years to discuss T&D research needs. The TAC members have identified this research gap which needs to be addressed to integrate high penetrations of renewable and DG on the grid. Another barrier to renewable integration is transmission congestion, **in part due to thermal and dynamic instability constraints**. Research on understanding which transmission lines would most benefit from dynamic thermal line ratings **and dynamic instability mitigation** could help increase transmission capacity for renewable generation and under extreme conditions.

The California ISO identified a specific research barrier regarding real-time monitoring. Grid operators want to incorporate frequency response and inertia limits into their generation commitment and dispatch procedures, but they do not know what these limits are for maintaining grid reliability. **One example of potential new tools would be real-time import nomograms.**

Grid protection systems have compounded the likelihood and extent of major wide-area outages, such as happened in the West in 1996, and in the Southwest in 2011. New science and technology in the form of algorithms using synchrophasor data could bring intelligence capabilities to protection systems that have the capability to adapt to changing conditions, but lack the real-time information to do so.

Q.4) Funding Priorities

What is the minimum and maximum amount of EPIC funds that should be set aside as match funding for federal awards? Please explain.

Suggestion: \$4-5 million per year, reset each year. Since \$21 million were provided by the Energy Commission for \$500 million dollars of stimulus funding, and since such a large amount of federal solicitations are unlikely to occur again anytime soon, one might expect that an order of magnitude fewer funds would need to be made available in routine years. At a 10-20% cap, for example, the maximum level of federal awards would be in the range of \$40-100 million dollars per year. [Also, please see **7) Other Comments** below for additional suggestions regarding this topic.]

Q.6) Advisory Structure

Should there be an advisory structure, and if so, what elements are most important?

Suggestion:

- 1) Yes, there should be an advisory structure. Depending on its scope of members, an advisory structure can serve many purposes:
 - a) Identify electric technology needs
 - b) Advise on technology state of art, research gaps, and what can be expected to be accomplished by the research community
 - c) Assist in technology transfer to end users, or intermediaries in the technology maturation process
 - d) Guide and assess research project progress and final outcomes.
 - e) Guide EPIC program content and evaluate its implementation for its administration

- 2) In the Electric Program Investment Charge Staff Proposal, February 10, 2012, - pp. 44-45, the CPUC staff made these suggestions regarding advisory structures:
 - a) "...based on the Commission's experience with complex procedural requirements that often come into play with the establishment of formal advisory bodies, we do not suggest that option."
 - b) "the administrator may, if it wishes, informally meet with stakeholders,"
In short, informal structures, procedures and meetings of advisory groups are likely to be more productive.

- 3) The advisory structure used for the Transmission Research Program under PIER might be used as a model, where there were, for example:
 - a) High management level advisors for program and administration matters
 - b) Medium management and professional technical leader level advisors for subprogram and technical matters
 - c) Technical level advisors for specific projects

- 4) The makeup of the various advisory groups would likely vary with the purpose and scope of the individual group drawn from a broad range of stakeholders, such as, industry, government, non-governmental organizations, academia, utilities, and others.

Q.7) Other Comments

Please articulate additional comments that would strengthen the Energy Commission's proposed EPIC Investment Plan.

- 1) See **CHAPTER 7: Program Administration: Match Funds for Federal Awards**
 1. Suggestion: Broaden scope beyond federal matching funds to include matching funds from other entities, e.g., other states, associations (e.g., WECC, CEATI), etc. other countries.

Suggested wording changes, p. 171, again, highlighted by using a “red Arial” font: A portion of EPIC funds will be set aside to leverage federal, **or other appropriate 3rd party**, funds and boost research investments and economic benefits to California.

2. Suggestion: The match funds should be capped at 20% of other 3rd party matching funds, with exceptions where warranted to obtain, assure and maximize benefits to electric ratepayers. This maximum level would accommodate, for example, federal solicitations for private entities, from whom 20% cost sharing is often required.

Suggested wording changes, , again, highlighted by using a “red Arial” font: EPIC match funds will be capped at **20 percent of the 3rd party award, except when it is in the best interests of ratepayers to exceed that cap on a case by case basis.**

3. Suggestion: Refine the proposed competitive process. The Plan states on p. 171: It is anticipated that the selection and evaluation of proposed bidders requesting EPIC funds to match federal awards will be through a competitive process similar to that described in this investment plan but emphasizing the criteria described in this section.

Routine Energy Commission competitive processes are too long to complete before a proposal would be due in a typical, (e.g., federal), solicitation. That leaves the proposers in the position of being able to only state that they have entered, or will enter, into an Energy Commission competitive process for EPIC match funds. The level of commitment embodied in such a statement is likely to be too weak to have any significant value in the evaluation by 3rd parties of the proposals submitted to them.

Suggested attributes of a selection process:

- a) The Energy Commission process for selection and evaluation of proposed bidders requesting EPIC funds be quick enough to accommodate the proposal development period allowed by the solicitation.
- b) Energy Commission staff review of proposed projects that the criteria listed in the Plan, p. 171, are met
- c) The 3rd party, e.g., Federal agency, conducts the competition
- d) For inclusion in proposals in response to a solicitation, a conditional (e.g., funding cap) letter of commitment from the Energy Commission be made available to each proposer who passes Energy Commission staff review in (a) above.

2) *Administration: Commission Staff Travel*

Suggestion: Various stakeholders have repeatedly emphasized the importance of communication and coordination among projects so as to leverage value and avoid duplication of research efforts. To achieve effective coordination, it is vital that Energy Commission staff be able to travel – for example, to attend professional meetings and conferences, to learn first-hand about ongoing work, or for related needs that arise in project

administration. In maximizing value to ratepayers, it is important not to be penny-wise and pound-foolish. Commission staff must be in a position to perform their job effectively and efficiently, which requires a reasonable degree of flexibility in allowing basic expenses such as travel.

With sincere wishes for a successful implementation –

Respectfully,

Dr. Merwin Brown, Co-Director, Electric Grid Research, CIEE

Lloyd Cibulka, Research Coordinator, Electric Grid Research, CIEE

Larry Miller, Research Coordinator, Electric Grid Research, CIEE

Dr. Alexandra von Meier, Co-Director, Electric Grid Research, CIEE