STATE OF CALIFORNIA

EPIC TRIENNIAL INVESTMENT PLAN 2015-17
Proposed Energy Research Initiative
Questionnaire

CALIFORNIA ENERGY COMMISSION

Title of Proposed Initiative (Short and concise): ***Research for Local-Scale Integrated Assessment of Energy-Water Co-Management***

Investment Areas (Check one or more) – *For definitions, see First Triennial Investment Plan, page 12*:

☒ Applied Research and Development

☒ Technology Demonstration and Deployment

☐ Market Facilitation

Electricity System Value Chain (**Check only one**): *See CPUC Decision 12-05-037, Ordering Paragraph 12.a. http://docs.cpuc.ca.gov/PublishedDocs/WORD_PDF/FINAL_DECISION/167664.PDF.*

☒ Grid operations/market design

☐ Generation

☐ Transmission

☐ Distribution

☐ Demand-side management

Issues and Barriers:

In the past, energy and water planners counted on a relatively stable assessment of climate, infrastructure and policy baselines. With climate change, planners face new uncertainties and forecasts of greater variability. Infrastructure plans must be revised, and the valuation of water, as a product or as an energy commodity, must also be reconsidered. In California, however, the various uses of water are managed through separate processes, and the impact of management objectives for one can result in sub-optimal practices for the other. The inefficiencies of this management structure will be amplified with predictions of greater year-to-year climate variability.

Understanding the effects of the water-energy-climate nexus on California ratepayers requires the coordinated scientific contributions of researchers from several disparate domains of science, and those who do not typically collaborate together. Finally, such research is greatly hampered by the absence of simple computational, analytical, and econometric tools for multi-scale, multi-objective analyses in order to predict the impact and effectiveness of climate mitigation, adaptation measures, or to set the value of water and energy.

Initiative Description and Purpose:

A Center for such research could coordinate collaborations efficiently from the leading scientists across the State. It could direct the development of computation analysis tools for linked climate-water-energy co-simulation and coordinate the analysis of specific management questions facing the State. Without a coordinated effort, we risk unorganized policy perspectives or inefficient use of research funds due to overlapping efforts.

Examples of analyses needs include (1) the planning of reservoirs for the American River basin and Sacramento urban region of California in order to mitigate risks due climate variability (2) the benefits and costs of installing utility-scale solar power stations and (3) the holistic valuation of water for agriculture in Central California.

Stakeholders:

- Utilities and regional water management boards
- Rate payers because they will experience increased water and electricity rates due sub-optimal co-management, including the incurred costs of intended consequences from erroneous policies.
- Local, regional, and state governments who are developing climate adaptation plans

Background and the State-of-the-Art:

- There is broad expertise across the state to provide domain-specific technical analyses. There is limited coordination among them at this time.
- A local-scale integrated assessment capability would allow stakeholders to observe the tradeoffs between multiple options and policy decisions. The current practice of executing single-domain process models does not allow such analyses. An integrated assessment platform could provide an open and extensible computational framework to enable the required simulations. Another challenge involves the need to plan against forecasts of increased periods of drought in response to well-established trade-offs between pricing and conservation to lower water use at the regional or local scales. These considerations require forecasts under a variety of scenarios spanning the range of impacts from climate change and demand for electricity and water.

Justification:

Describe how this technology or strategy will provide California IOU electric ratepayer benefits and provide any estimates of quantified annual savings/benefits in California, including:

- This research applies to all California energy production and end-use sectors.
- The research will mitigate the impacts of climate variability on water and energy resiliency.
- The research will provide quantitate measures of the value of water for its various uses in the State.

Ratepayer Benefits (Check one or more)**:**

☒ Promote greater reliability

☒ Potential energy and cost savings

☐ Increased safety

☒ Societal benefits

☒ Environmental benefits – specify—protection the California population from extreme climate and assuring reliability of energy supply during extreme climate events

☒ GHG emissions mitigation/adaptation in the electricity sector at the lowest possible cost

☐ Low emission vehicles/transportation

☐ Waste reduction

☐ Economic development

Describe specific benefits (qualitative and quantitative) of the proposed initiative

Resulting research will answer such questions as: How sustainable are water, energy and environmental inputs and outputs to/from a region? What is the comparative reliability of alternative water and energy supplies? How will variability of climate change impact water availability and demand? What are the implications of renewable energy development (e.g., pricing of solar electricity generation and biofuel production and refining) for sustainability? What are the market tradeoffs of biofuel design requirements? Should water flows and transport be linked to energy grid management?

Public Utilities Code Sections 740.1 and 8360:

Please describe how this technology or strategy addresses the principles articulated in California Public Utilities Code Sections 740.1 and 8360. The California Public Utilities Code is available online at www.leginfo.ca.gov/cgi-bin/calawquery?codesection=puc.