

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



Title of Proposed Initiative (Short and concise): **Research to Support Energy and Infrastructure Systems Adaptation in a Changing Climate**

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

California Energy Commission

DOCKETED**12-EPIC-01**

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Issues and Barriers:

Climatic changes are causing more severe and frequent storms, heat waves, droughts, wildfires, and related impacts that endanger energy, economic, ecologic, and social systems and often present direct human health hazards. Scoping assessments have outlined conceptual approaches to adaptation planning and decision-making including the use of cost curves to prioritize identified measures. Yet there is a dearth of research evaluating specific needs and challenges at the level required for implementation and adaptation actions implemented to date are limited. Existing climate model projections must also be critically analyzed to identify and distill the information required for robust quantitative assessments of energy systems, economic, and health risks and the benefits of various adaptation approaches. Climate model results are routinely published in a form suited for the earth-science research community, rather than for the energy markets community.

Initiative Description and Purpose:

Valuing the benefits of potentially costly adaptation measures requires accurate estimates of costs of specific impacts. Direct collaboration among impact, adaptation, and climate modeling experts will enable analysis of climate model output that is more targeted to the risks of specific impacts and the benefits of reducing those risks.

Informed mitigation planning must also proactively consider the adaptability of key systems to climate impacts. An important example is biofuel production, which is a critical climate mitigation pathway that, in turn, has distinct vulnerabilities to climate change. Biofuels are a highly climate-dependent resource, and comprise a significant and growing share of US liquid fuel use.

Stakeholders:

- Utilities who must develop climate adaptation for their energy production and distribution systems.
- Regional governments who must prepare resources for climate adaptation
- Local governments who must also prepare plans for climate adaptation

Background and the State-of-the-Art:

- There are currently programs in California to provide the broad technical expertise and applied research experience to tackle the interdisciplinary scientific challenges associated with climate adaptation.
- The goal of this project is to demonstrate the ability to address critical adaptation-related challenges: (1) prioritizing measures to improve heat resilience of energy production distribution systems as well as cities and buildings, and (2) identifying challenges and opportunities related to fuel feedstock production—such as biomass for bioenergy production. A synergistic third research activity will be (3) using the information needed for adaptation planning as a driver for analysis of highly resolved climate model projections and assessment of model development priorities.
- Infrastructure resilience research addresses specific research gaps identified in a recent California assessment of extreme heat adaptation needs. The results will be usable in the development of building codes and zoning ordinances that anticipate changing climate conditions (in terms of safety, energy, and peak power). Private-sector applications include enhancements to catastrophe loss models and loss-prevention. This work can provide a concrete, in-depth exemplar of a much broader array of loss-prevention technologies that enhance the ability for vulnerable groups to shelter in place or otherwise improve resilience to a wide variety of natural hazards.

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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.
- This research will provide specific and geographically resolved metrics of heat stress for both life safety and building comfort and productivity impacts.
- The research will identify specific metrics related to temperature, precipitation, evapotranspiration, high wind events, and soil moisture.
- The work will evaluate the suitability of current high-resolution and downscale models to provide the specific metrics and the associated uncertainties.

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

Valuing the benefits of potentially costly adaptation measures requires accurate estimates of costs of specific impacts. Direct collaboration among impact, adaptation, and climate modeling experts will enable analysis of climate model output that is more targeted to the risks of specific impacts and the benefits of reducing those risks.

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.