STATE OF CALIFORNIA

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

Title of Proposed Initiative: "California Water-Energy Innovation Cluster"

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

X_ *Applied Research and Development* X_ *Technology Demonstration and Deployment*
X_ *Market Facilitation*

Electricity System Value Chain (**Check only one**):

_ *Grid operations/market design* _ *Generation*
_ *Transmission* _ *Distribution*
X *Demand-side management*

Issues and Barriers:

Describe the issues and barriers that are impeding full market adoption of the proposed clean energy technology or strategy (such as cost, integration, or lack of information). Transportation, treatment, storage and distribution of water uses large amounts of electricity in California. There are hundreds of water agencies throughout California, some very large, such as Metropolitan Water Districts of Southern California, and others local, single purpose, such as a rural agricultural water district. Renewable energy technology, for any application, has been selectively adopted by the largest agencies, but due to cost considerations, lack of training, familiarity with current operational practices, or lack of access to information, many water agencies have not implemented renewable energy technology. This situation has been exacerbated by the current drought, which has limited revenues for water agencies and increased cost of water supply.

Initiative Description and Purpose:

How will this technology or strategy help address the issue/issues? Describe knowledge to be advanced to overcome critical barriers. Include the recommended funding level (minimum and maximum) for each project under this initiative. The proposed "Water and Energy Innovation Cluster" will draw together core universities and research entities, water agencies, the engineering and industrial communities, and water agencies, to focus on the public education which values the use of less energy and water, and the development and testing emerging and commercializable water and energy technologies. The proposed funding level is $1 million per year through the duration of the EPIC program. This program will build upon the work of the well-established La Verne Water Technology Conference, and its organizing entities. These include Burns & McDonnell, one of the foremost electrical infrastructure firms in the United States, the Lewis Group of Companies (nationally-known real estate developer), the San Gabriel Valley Economic Partnership (100+major industrial entities including SCE). All of these entities have been participants/co-organizers at the four-year Water Technology Conference, which in January 2014 featured the Water/Energy Nexus with top federal, state and private sector speakers including the ranking member of the House water and power subcommittee. The proposed program will draw together, beginning in 2014 and on an ongoing basis, urban water agencies, universities, industrial and institutional water end users, and other core participants in Southern California, for ongoing review and support of emerging, commercializable and market-ready water/energy technologies, their cost, availability and deployment. Within this effort, Burns & McDonnell will serve as a clearinghouse for the water/energy nexus research and technology development regionwide. As these technologies are identified, they will be presented both at formal conferences at the University's regionwide network of university centers. At each conference, training will also be provided, in association with other regional universities, on commercialization and use of the promising water/energy technologies. The program will involve collaboration with major water agencies, industry, and the university sector in this region.

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Stakeholders:

Identify the stakeholders who support the initiative.

A core group of individuals from the public and private sector have been working together to support the water-energy nexus. These include William Lyte, Burns & McDonnell, Frances Spivy-Weber, State Water Resources Control, Maria Mehranian, Regional Water Quality Control Board, Dr. Cynthia Truelove, The Truelove Companies, Tim Brick, Southern California Watershed Council, Philip Hawkey, a noted educator, and other leaders in the water-energy sector. Many of these individuals serve as advisors to the State of California on the water-energy nexus.

Background and the State-of-the-Art:

What research development and demonstration has been done or is currently being done to advance this technology or strategy (cite past research as applicable)? There is extensive activity in these categories underway within the university community, water agencies, including internationally (Australia and Israel, for example) but they are not unified or effectively integrated within the water agencies and engineering community to be applied on water-related infrastructure projects.

Describe any public and/or private successes and failures the technology or strategy has encountered in its path through the energy innovation pipeline: lab-scale testing, pilot-scale testing, pre-commercial demonstration, commercial scale deployment, market research, workforce development. Metropolitan Water District has one of the world's preeminent water laboratories located in the San Gabriel Valley, California, which is focused on many of these issues for its use and that of others which build relationships with it.

Identify other related programs and initiatives that deal with the proposed technology or strategy, such as state and federal programs or funding initiatives (DOE, ARPA-E, etc.). The U.S. Bureau of Reclamation has grants which may address the energy/water nexus. U.S. DOE has also begun looking at this issue from the funding perspective.

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:

- **Name of sector and estimated size and energy use.** There are 300 Municipal water agencies in the State of California, and nearly 1/3 of them are in urbanized Southern California. Southern California Edison has conducted research on their energy use in preparation for the energy supply reduction due to the shutdown of SONGS.
- **Quantifiable performance improvements for the proposed technology/strategy.** The water industry is highly unified through industry organizations. If best renewable energy/water nexus technologies are developed and showcased within this program, there can be rapid integration of them throughout the industry.
- **Maximum market potential, if successful.** California is on the leading edge of the water/energy nexus, at least for the U.S. Technologies developed in California, including those related to storm water, can be deployed nationally through the integrated national engineering community and water industry forums.
- **Number of direct jobs created in California**. There would be at least 500 jobs created in California through the commercialization, assembly and installation of water/energy related renewable energy technology.
- **Why this research is appropriate for public funding.** Water is the most critical resource for human habitation. California is completely dependent upon highly scarce water supplies, with a rapidly expanding population. If the water/energy nexus is not improved through better technologies, California will continue to consume increasing amounts of energy on its water supply.

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

_X Promote greater reliability
_ Increased safety
_ Environmental benefits – specify
_ Low emission vehicles/transportation
_X Economic development
_X Potential energy and cost savings
_X Societal benefits
_X GHG emissions mitigation/adaptation
_ Waste reduction

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

The California Water-Energy Innovation Cluster will bring together, on a continuing basis, the top research and commercializable water-related renewable energy technology, and integrate it into California's water agencies and engineering firms, in support of national technology acceptance and utilization, through a highly orchestrated series of programs, research projects, training initiatives and conferences, staged from its central campus and regional network of university facilities, and building upon its four year Water Technology Conference series.

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. Under Section 740.1., the project would offer a reasonable probability of providing benefits to ratepayers, not unnecessarily duplicate research, support environmental improvement, conservation by efficient resource use or by reducing or shifting system load, development of new resources and processes, particularly renewable resources and processes which further supply technologies, and improve operating efficiency and reliability or otherwise reduce operating costs. Under Section 8360, the project would help to modernize the state's electrical transmission and distribution system to maintain safe, reliable, efficient, and secure electrical service, including deployment and integration of cost-effective distributed resources and generation, including renewable resources, and development and incorporation of cost-effective demand response, demand-side resources, and energy-efficient resources.