



Title of Proposed Initiative: Facilities and Programs of Accelerating Building Performance Solutions that Deliver Guaranteed Savings

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:

Buildings consume 40% of all energy used and over 70% of electricity, and the commercial sector is responsible for almost half of this impact. While some progress has been made in reducing the energy use intensity and overall consumption of the sector we are not yet on track to meet the aggressive performance goals set by the CPUC for 2020 and beyond.

Both the fragmented nature of the building industry- (technology suppliers; design and engineering firms; contractors; investors/tenants/owner/operator) and the risk adverse/capital limited investment decision-making process all contribute to underinvestment in the development and applications of design and operating solutions that are capable of transforming the sector to approach the state's net zero energy goals.

Initiative Description and Purpose:

Direct measurement, prediction and optimization of the energy and demand performance (and related business benefits, e.g. comfort) of integrated building systems would help advance both public and private sector investment both in R&D and in deployment of solutions that work. While useful aggregate data can be gathered in volume with smart meters on many buildings, information that directly quantifies causal relationships and impacts, and allows extrapolations to other conditions, is much more difficult to obtain. It is this data that is essential to driving new R&D investment in new high performance solutions, and in driving capital investment in widespread deployment of these solutions in the states new and retrofit construction.

CEC/EPIC and California more broadly, should cultivate, support and drive research projects through California-based facilities for purposes of addressing these market barriers.

Of particular value are test-beds and research facilities that can accurately quantify the potential savings of emerging technologies; demonstrate their performance; model, measure and manage their impacts and advance policy solutions that reflect these research realities.

Several California-based facilities exist today to launch the effort; others could be added as needed over time at different locations statewide. The initiative would support a significant multi-year funding to support California-based research testbeds and facilities to gather accurate, objective, end use data on a range of research topics that will help California achieve its ambitious energy policy goals. Further the initiative would support extending and scaling research results conducted under these “controlled” conditions to more deployable applications in new and existing buildings, using both extensive simulation studies to extrapolate testbed results to other applications and a “Living Laboratory” model to capture other implementation and occupancy effects. The initiative would also support a commercialization and deployment outreach agenda to ensure that results and lessons learned are rapidly deployed via utility incentive and rebate programs, new codes and standards, rating and labeling programs, and other local, regional and national initiatives.

Stakeholders:

This effort would be supported by a wide cross section of the commercial building industry, including the following groups with whom some discussion has already occurred:

1. Real estate investors
2. Building owner/operators (public and private)
3. Architects/AIA
4. Engineers/ASHRAE
5. Contractors and installers
6. Utilities
7. Manufacturers and building system solution providers
8. USGBC and related rating groups
9. Trade press, e.g. McGraw Hill
10. Academic and research organizations

The launch of such a program would quickly add other interested partners.

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)?
- 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.
- 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.).

As disclosure laws require measured performance to be publicly shared, the gap between “design expectations” and real performance has become more visible and troublesome. If performance expectations cannot be reliably met, that reduces the incentive to invest in strategies and solutions that have been promoted to date. When we build cars or aircraft the manufacturers guarantee performance (under explicit boundary conditions). No such performance guarantees are routinely given in the building sector. This represents one of the cutting edges of R&D today in both development of new simulation tools capable of predicting “real” performance, as well as creating new technology solutions that can be reliably implemented, calibrated and operated as intended.

Several programs are underway at the national and state level to address elements of this challenge. This effort expands on existing disparate RD&D elements and adds a unique new element could help link them to a new facilities As “user facilities” located California become more widely available and cultivate specialized research areas and industry partners representing pathways to commercialization, they create solutions “geographically” relevant to California’s energy needs and marketable outside the region.

**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.
- Quantifiable performance improvements for the proposed technology/strategy.
- Maximum market potential, if successful.
- Number of direct jobs created in California.
- Why this research is appropriate for public funding.

The referenced research facilities and testbeds have the potential to directly address all aspects of new and retrofit commercial construction, residential applications, difficult to reach segments of the built environment. A conservative estimate of energy savings is over 5000 GWh/yr.

The initiative would have immediate impacts on existing programs and end use as well as longer term impacts on 2030 and 2050 program goals that California is predicted to have difficulty achieving. It will create jobs both at the manufacturers of new technologies which are verified by the program and then will have greater market impacts, and as it relates to installing and operating new integrated building systems. Private companies are exploring the use of these kinds of facilities for their proprietary purposes. But unless public funding drives the R&D agenda and supports the work being carried out the benefits will accrue to the private interests that support the projects. Since the impacts are widespread and address many aspects of the CPUC planning for future energy needs, a significant public role is both appropriate and critical.

Ratepayer Benefits (Check one or more):

- Promote greater reliability
- Potential energy and cost savings
- Increased safety
- Societal benefits
- Environmental benefits - specify
- 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

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.