

Title of Proposed Initiative: Improving measurement of energy savings from energy efficiency programs

Investment Areas: (one or more)

Market Facilitation

Electricity System Value Chain: (only one)

Demand-side management

Issues and Barriers:



Current evaluation, measurement and verification practices often rely upon modeled data and short evaluation periods. This is insufficient to justify the magnitude of ratepayer funds allocated to energy efficiency. From 2010 through 2012, nearly 2.2 billion dollars of ratepayer moneys were spent on energy efficiency by investor-owned utilities (IOUs) in California, with little credible evidence to validate performance outcomes.¹ It is critical to ensure that ratepayer funds are directed towards the programs and investments that most cost-effectively maximize benefits. Today, we have little knowledge of the actual magnitude of energy savings over time, or how these savings vary across geography, season, industry and demography. This information is crucial to understanding the successes and weakness of current programs and to effectively targeting future investments.

To robustly assess savings, electricity usage data from customers participating in programs must be compared over time to similar customers who did not participate in such programs, controlling for weather and other factors that can affect energy consumption. Together, this yields a credible estimate of the energy savings attributable to the program. Simply applying assumed performance factors based upon engineering models does not take into account critical factors such as human behavior that can significantly alter the impact of energy use.²

The underlying challenges to achieving more robust assessment of savings are data availability, preservation, and access. At present, the IOUs are the sole stewards of most customer consumption data, with limited exception as directed by the California Public Utilities Commission. Yet IOUs do not always preserve billing data over several years, nor are they required to measure claimed savings. Without a systematic approach to long-term stewardship of customer-level energy use and program participation data, reliable assessment of energy savings over time and across space is not possible.

Initiative Description and Purpose:

To address this gap we propose the California Energy Commission fund an initiative to systematize the collection, linkage, preservation, and analysis of the following data on an ongoing basis for at least ten years:

- Permanent site ID of residence or commercial establishment
- Customer account ID

¹ California Energy Efficiency Statistics <http://eestats.cpuc.ca.gov/>

² Allcott, H., and Greenstone, M. (2012). "Is there an energy efficiency gap?" NBER Working Paper 17766. Available at: <http://www.nber.org/papers/w17766.pdf>

- Meter-level monthly electricity consumption data
- Address-level program participation data, including program type and intervention date
- Other significant modifications to building stock that may affect energy use, including retrofits, expansions, adoption of solar photovoltaic panels, electric vehicle charging stations, absorptive chillers, cogeneration equipment, etc.

While these data may already exist, pulling them together into one dynamic database that is maintained and updated over time enables the analysis needed to robustly assess energy savings resulting from programs and ensures that ratepayers are benefiting from these investments. Tracking actual changes in consumption over time, rather than using short-term or modeled data, will generate significant benefits for California electric IOU ratepayers. Only through such ongoing and ground up evaluation can the impacts and benefits of energy efficiency investments be understood. With improved understanding of cost-effectiveness of programs will come improved ability to allocate funding to the programs that yield the greatest cost savings and other benefits to ratepayers. We recommend this initiative be funded at \$750,000–1,000,000.

Stakeholders:

This initiative is supported by the California Public Utilities Commission, the Governor’s Office of Planning and Research, the Southern California Regional Energy Network, and the Los Angeles Regional Collaborative for Climate Action and Sustainability.

Background and the State-of-the-Art:

A pilot-scale project to demonstrate the value of collection, linkage, and analysis of the data specified above is currently underway in Los Angeles County, funded by the CEC’s Public Interest Energy Research program. This project has collected a multiyear census of customer-level monthly electricity consumption data that researchers are analyzing to create high-resolution baselines of energy use across the County.^{3,4} Customer-level program participation data are now being collected and linked to consumption data to begin to assess the effectiveness of a small subset of energy efficiency programs that have been carried out.

This project has uncovered significant gaps in attention to the storage, preservation, and analysis of energy consumption and program participation data. Data are stored in idiosyncratic formats within and across utilities, with no one department responsible for maintaining master databases combining these data. There is little review or quality control of stored data, and data are often not retained beyond a few years. California’s IOUs appear to be foregoing a significant opportunity to better understand which programs are most effective and why, much less to accurately quantify ratepayer benefits. Given these realities, there would be significant cost savings resulting from a systematic statewide mechanism.

³ Pincetl et al. (2012) “Methodologies to establish regional energy baselines.” Interim project report, California Energy Commission Public Interest Energy Research.

⁴ Circella et al. (2013) Updating the PECAS modeling framework to include energy use data for buildings.” Interim project report, California Energy Commission Public Interest Energy Research.

Further, opportunities may exist to leverage the data transfer protocols established by the U.S. Department of Energy and other partners.

Justification:

This strategy has application to all stationary consumption of electricity in California, spanning residential and non-residential sectors. Engineering analyses have estimated that between 20 and 60 percent of electricity consumed in the U.S. can be conserved at a negative cost.⁵ This suggests that energy efficiency is potentially a vast resource for simultaneously generating cost savings and supporting California's aggressive energy and environmental policy objectives. The proposed initiative will improve these estimates to enable more informed comparison of energy efficiency programs versus other approaches. We estimate that this initiative would create eight full-time equivalent positions to develop and implement systematic protocols and to manage, update, and analyze the specified data. In addition, it would fund the education and training of several students. This proposal has the potential to generate significant ratepayer benefits, and is thus appropriate for public funding.

Ratepayer Benefits: (all that apply)

- Potential energy and cost savings
- Societal benefits
- Environmental benefits (specify)
- GHG emissions mitigation/adaptation in the electricity sector at the lowest possible cost
- Economic development

This proposal will directly improve evaluation of energy savings resulting from IOU-sponsored programs in a cost-effective manner, providing analysis that enables optimization of future programs and supports achievement of California's energy and environmental policy objectives for least cost. Better understanding of cost-effective opportunities for capturing energy savings through energy efficiency programs provides ratepayers with not only cost savings but also mitigation of greenhouse gas emissions and reduction of air pollution, improving public health and reducing future climate change adaptation expenditures. Further, promoting energy efficiency in commercial establishments increases their economic competitiveness, supporting California's economic development.

Public Utilities Code Sections 740.1 and 8360:

This initiative is supports the principles articulated in California Public Utilities Code sections 740.1 and 8360 by providing significant likelihood of ratepayer benefits, improving and extending the state of the art for assessing energy savings, maximizing the efficiency of such evaluations through systemization, non-redundancy, and the increased use of cost-effective digital information to improve efficiency of deployment of demand response, demand-side management, and energy efficiency resources, generating environmental benefits, promoting conservation by efficient resource use, and promoting the welfare of California's residents and businesses.

⁵ Rosenfeld et al. (1993). "Conserved energy supply curves for U.S. buildings." *Contemporary Policy Issues* 11(1): 45-68.