

## DOCKETED

<b>Docket Number:</b>	17-EPIC-01
<b>Project Title:</b>	Development of the California Energy Commission Electric Program Investment Charge 2018 â€“ 2020 Triennial Investment Plan
<b>TN #:</b>	215848
<b>Document Title:</b>	Rishee Jain Comments: Data-driven benchmarking of building energy performance
<b>Description:</b>	N/A
<b>Filer:</b>	System
<b>Organization:</b>	Rishee Jain
<b>Submitter Role:</b>	Other Interested Person
<b>Submission Date:</b>	2/10/2017 1:01:04 PM
<b>Docketed Date:</b>	2/10/2017

*Comment Received From: Rishee Jain*

*Submitted On: 2/10/2017*

*Docket Number: 17-EPIC-01*

**Data-driven benchmarking of building energy performance**

*Additional submitted attachment is included below.*

**CALIFORNIA ENERGY COMMISSION**

1516 NINTH STREET  
SACRAMENTO, CA 95814-5512  
www.energy.ca.gov



The Energy Commission is currently soliciting ideas and stakeholder input for the 2018 – 2020 EPIC Triennial Investment Plan. For those that would like to submit an idea for consideration in the 2018-2020 EPIC Triennial Plan, we ask that you complete the form below. Submittals are due by **5:00 p.m. on February 10, 2017.**

**Part 1. Initiative Description and Purpose:**

1. Please provide a brief description of the proposed initiative:

As the result of AB802, widespread data will now be collected and aggregated for hundreds of thousands of buildings across the state of California. This deluge of data represents a tremendous opportunity to understand how energy is being consumed in our buildings, benchmark building energy performance, identify/quantify high impact energy efficiency upgrades and craft data-driven energy efficiency policies. We propose an initiative to spawn the development of new data-driven methods and models that can harness the power and information in these new emerging data streams and help drive sustained and deep energy savings from our existing buildings and facilities. The focus will be development of both new analytic tools for benchmarking and policies that can rely upon data-driven benchmarking.

2. What technical and/or market barriers would the proposed initiative help overcome? For scientific analysis and tools, what knowledge gaps would the proposed initiative help fill?

Significant research and tools exist to model and simulate energy usage of buildings using engineering and physics based models. While such models are valuable, they face difficulty scaling to large numbers of buildings due to the significant amount of input information (e.g., physical characteristics, building materials, geometry) required for them to be accurate, especially given that much critical data comes from data bases that are outside of the benchmarked database (e.g., in New York City, PLUTO contains invaluable information for understanding building energy efficiency potential but that data is outside of the formal building data collected under the City's benchmarking ordinance.) . Additionally, previous work has tried to building benchmarking databases but such work was limited in it's ability to building models and tools on top of such data. The other barrier is that most benchmarking initiatives focus on collecting, analyzing, and publishing data, with insufficient linkage to how that benchmarked data can drive new policies and efficiency efforts. Data alone will not result in vast new energy efficiency savings for California.

## Part 2. Benefits and Impacts

3. If this initiative is successful, either fully or partially, what would be the expected impact?  
Who are the primary users and/or beneficiaries?

If successful, this initiative would provide a set of models and tools for use by statewide energy policy and planning agencies, municipal governments, and individual building owners and operators looking to utilize state programs to drive energy savings in their buildings through utility customer funded efficiency programs, local grants, private financing such as PACE, or other avenues . State agencies and municipal governments would have powerful tools that would allow them to understand the landscape of energy usage in the current building stock, benchmark buildings to determine which are the most inefficient, and strategically design and deploy policies and programs to maximize the savings impact of energy efficiency initiatives. Individual building owners and operators would be able to in real-time benchmark their building against other buildings and identify potential opportunities for energy efficiency upgrades and state/local programs that align with such identified opportunities.

4. Describe what quantitative or qualitative metrics or indicators would be used to evaluate the impacts of the proposed initiative:

Quantitative metrics - accuracy of models in identifying inefficient buildings, dollar per kWh saved ratio for data-driven policies and programs, reduction in overall energy usage and, where applicable reduction in GHG emissions and water usage, prediction accuracy of models/tools, development of new data-based policies and programs

Qualitative metrics - satisfaction of building owners and operators on benchmark initiatives, accessibility and impact of energy efficiency policies and programs, ease of use for state/municipal employees/workers, how well do new models

5. Please provide a list of peer-reviewed references that support the responses for questions 3 and 4. Proposed initiatives that include peer-reviewed references will be given stronger consideration.

Hsu, David. "Improving energy benchmarking with self-reported data." *Building Research & Information* 42.5 (2014): 641-656.

Hsu, David. "How much information disclosure of building energy performance is necessary?" *Energy Policy* 64 (2014): 263-272.

Chung, William. "Review of building energy-use performance benchmarking methodologies." *Applied Energy* 88.5 (2011): 1470-1479.

Kinney, Satkartar, and Mary Ann Piette. "Development of a California commercial building benchmarking database." Lawrence Berkeley National Laboratory (2002).

Kontokosta, Constantine. "Local Law 84 Energy Benchmarking Data: Report to the New York City Mayor's Office of Long-Term Planning and Sustainability." (2012).

Marasco, Daniel E., and Constantine E. Kontokosta. "Applications of machine learning methods to identifying and predicting building retrofit opportunities." *Energy and Buildings* 128 (2016): 431-441.

Kavousian, Amir, and Ram Rajagopal. "Data-driven benchmarking of building energy

6. (For technologies only) What competitive advantages does the proposed technology solution have over current benchmark technologies? If the technology is beyond the prototype stage, what strategies do you suggest to bring to scale?

**Part 3. Connection to Energy Commission’s EPIC Framework**

Energy Commission staff have developed a draft strategic framework to guide the CEC’s planning and implementation of EPIC across triennial investment cycles. One of the objectives of the draft strategic framework is to communicate a consistent set of priorities for organizing current and future EPIC investments.

7. Please indicate which of the following strategic framework themes you feel the proposed initiative best fits within:

- Advance Technology Solutions for Deep Energy Savings in Building and Facilities
- Accelerate Widespread Customer Adoption of Distributed Energy Resources
- Increase System Flexibility from Low-Carbon Resources
- Increase the Cost-Competiveness of Renewable Generation
- Create a Statewide Ecosystem for Incubating New Energy Innovations
- Maximize Synergies in the Water-Energy-Food Nexus
- Develop Tools and Analysis to Inform Energy Policy and Planning Decisions
- Catalyze Clean Energy Investments in California’s Underrepresented and Disadvantaged Communities

Develop Tools and Analysis to Inform Energy Policy and Planning Decisions

If Other, Please Specify

Advance Technology Solutions for Deep Energy Savings in Buildings and Facilities
--