Title of Proposed Initiative: Demonstrate "AutoM&V" as a basis for determining energy efficiency 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

☐ Grid operations/market design
☐ Generation
☐ Transmission
☐ Distribution
☒ Demand-side management

Issues and Barriers:

Existing methods to determine gross energy efficiency savings of deployed programs (*ex post)* requires resource intensive and time-consuming data acquisition and calculation. Consumers' tolerance for data gathering required for energy efficiency evaluation seems to be falling, with this reluctance seemingly offsetting energy efficiency programs positive efforts to raise efficiency. To the extent EM&V activities could be made less costly, more prompt with equal or improved information about the savings, barriers to expanding energy efficiency would be reduced.

- More timely results allows quicker program adjustments to achieve maximum program efficiency
- Less costly results allows other EM&V issues to be addressed from existing budgets, or more funds to flow to programmatic activity
- Equal or improved savings information allows better programmatic decisions while distributions of savings within a program allows identification of more promising sub-populations for effective targeting

In addition, no methods currently exist to compare and assess various energy efficiency savings methodologies. This strategy would develop objective, transparent comparison methodologies. This would support the continuous refinement of energy efficiency savings methodologies.

Finally, the specific methods to be considered naturally connect to the approaches in continuous energy improvement programs (e.g. ISO 50001 or the Federal Better Buildings program), and enabling a logical connection with state/utility energy efficiency savings methodologies could reduce the prospect of these programs undergoing double measurement (one internal and one for external savings validation). By removing this prospect, participation in these programs should rise, particularly if this allows access to local utility energy efficiency program resources.

This would reduce M&V costs allowing more resources for energy efficiency delivery The goal of this project will be to demonstrate an alternative approach relying on whole building, high time resolution usage data (from AMI systems). Compared to traditional M&V methods, it produces results that are prompt, less expensive and also can provide distributions of site-specific savings within a program. It

is consistent with and builds on the approach taken in emerging automatic energy management reporting systems (e.g. ISO 50001) An essential component of the project is to complete development of objective methods to compare *ex post* gross savings determination methods. This will provide the first objective validation of the methods used to determine gross energy efficiency savings.

Initiative Description and Purpose:

This initiative has several components"

1. Develop extensive usage data sets for a population of interest that is/was the target of an energy efficiency program (e.g. a type of residential or small commercial retrofit project). Accordingly participants and non-participants would be included. The population (participants and non-participants) should be large enough to test whether size is important to the metrics considered below,
2. Develop alternative methodology accuracy test criteria
3. Determine gross energy efficiency savings using a conventional methodology and the "autoM&V" methodology providing the best outcomes on the methodology test criteria;
4. In addition to accuracy metrics, track and compare cost and time to produce each energy efficiency savings result.
5. Consider autoM&V as a basis for continuous energy improvement program accomplishment measurement. This could begin to lay a common foundation between traditional program energy efficiency savings measurement and the spreading practice of standardized energy management (ISO 50001, or the Federal Better Buildings program)

The purpose of this initiative would be develop and demonstrate the effectiveness in autoM&V in producing accurate gross energy efficiency savings information in less time and at substantially less cost than traditional methods. It will also provide methodologies to analyze new methodologies to assess their relative performance with existing approaches.

Recommended funding: $1,000,000

Stakeholders:

Ideas similar to this strategy have been presented at the 2012 ACEEE Summer Study and the 2013 IEPEC. Generally users and funders of energy efficiency savings analysis are interested: regulators, policy makers, utilities, program designers and implementers.

Background and the State-of-the-Art:

Work of this strategy was begun as part of a study of preferred auto-benchmarking, or auto-baselining work done for Pulse Energy and published in part of http://www.pulseenergy.com/wp-content/uploads/lbnl-5886e.pdf.

The first medium-scale development of "autoM&V" was conducted by PG&E and LBNL as part of an emerging technology demonstration available at http://www.etcc-ca.com/reports/energy-management-and-information-system-software-technology-assessment-considerations .

Similar ideas are presented in the draft energy efficiency standardization coordinating collaborative (EESCC) draft roadmap (until March 15, 2014, available for comment at: **EESCC Standardization Roadmap V1.0 draft**) . See section 4.1.2.3 of that document.
While other work maybe underway, the authors are not aware of it.

Justification:

The main benefits of pursuing this strategy are that

1. energy efficiency savings determination begins to become a low-cost component of energy efficiency deployment, and
2. objective, documentable methods are available to assess improvements in energy efficiency savings methodology, something that has not existed to date.

While these would only apply to certain sectors where automatic data acquisition exists (residential and small commercial) for evaluations in those area, gross savings costs can be reduced by at least 50%.

Public funding is appropriate for research on this strategy because

1. there will be no actual or perception in bias of the results and
2. the tools and methods can be made publically available providing the transparency necessary to raise confidence in these methods and the results they produce, and

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

The initiative could result in more rapid, less expensive, more informative and accurate measurement of energy savings in many residential and commercial energy efficiency programs. This would reduce costs to electricity ratepayers and provide for better and more efficient programs.

It would represent a significant benefit from the recent AMI deployment in California.

Please describe how this technology or strategy addresses the principles articulated in California Public Utilities Code Sections 740.1 and 8360.

740.1

(a) Benefits: This strategy would benefit ratepayers my reducing the burden of energy efficiency measurement costs and increasing confidence in energy efficiency savings results,
(b) Avoid low probability of success: This strategy has produced positive results and the current stage would refine those; accordingly it has a high likelihood of success,

(c) By facilitating the reliability of energy efficiency savings estimates, it increases confidence in EE's place in resource plan loading orders.
(d) No comparable research is known to be underway.
(e) The strategy supports (1) improving the environment and (3) reducing system load.