

From Theory to Practice: Lessons Learned from an Advanced M&V Commercial Pilot

Eliot Crowe

Lawrence Berkeley National Laboratory

Background

Berkeley Lab Team



Jessica Granderson



Eliot Crowe



Sam Fernandes



Samir Touzani

Partners

- Michele Melley (CT DEEP)
- Miles Ingram (Eversource)
- Dick Oswald (UI)
- Elizabeth Titus (NEEP)

Sponsor

- U.S. Dept of Energy

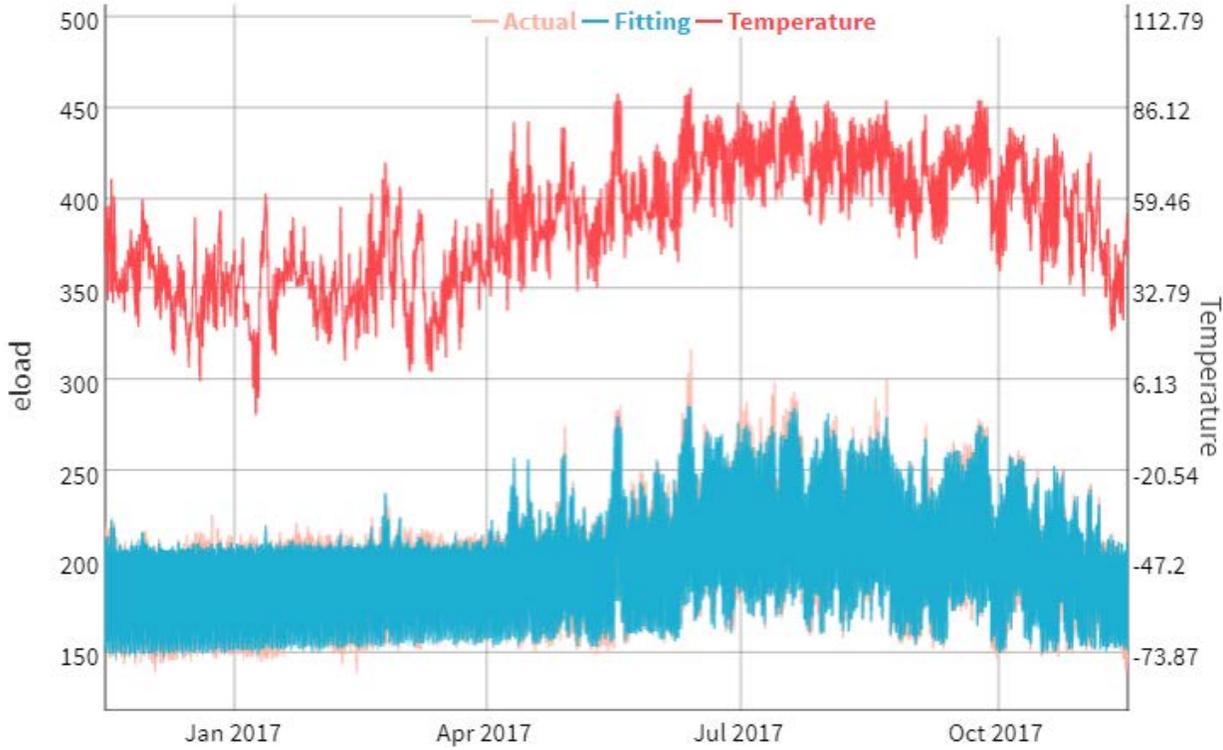
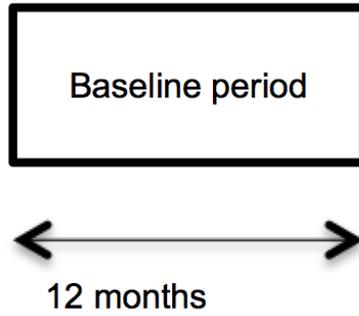
Background

Pilot Overview

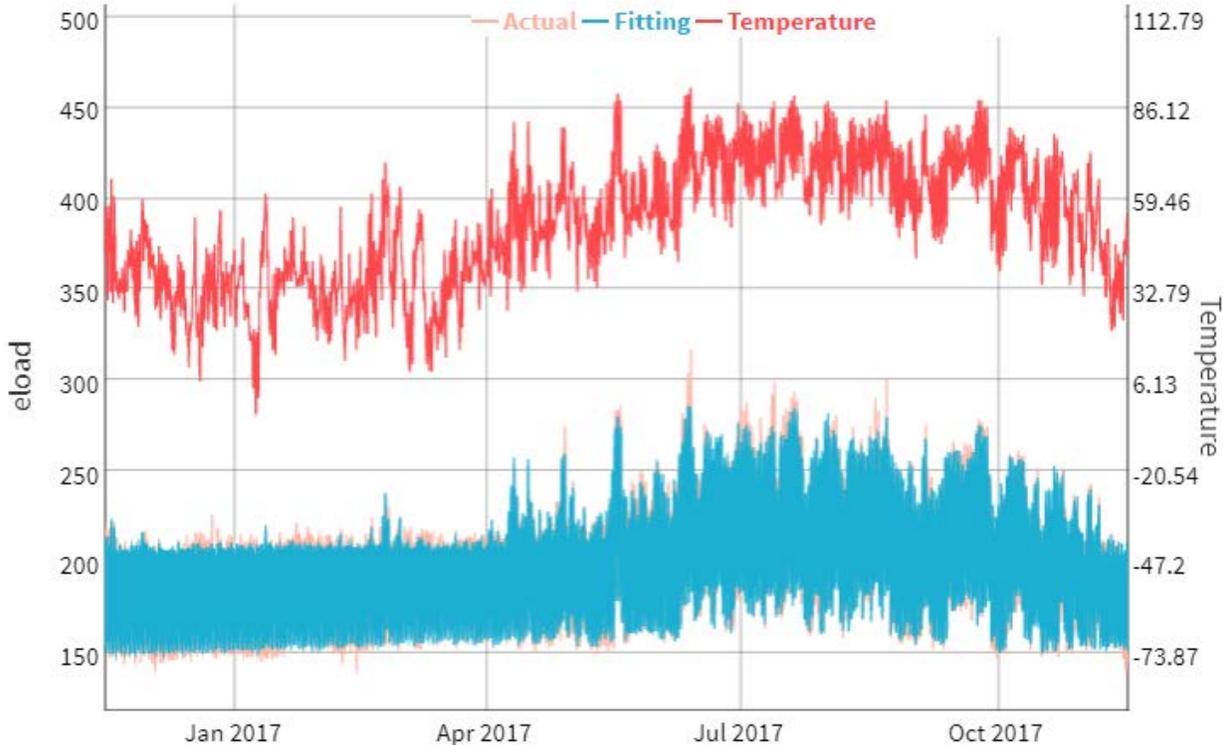
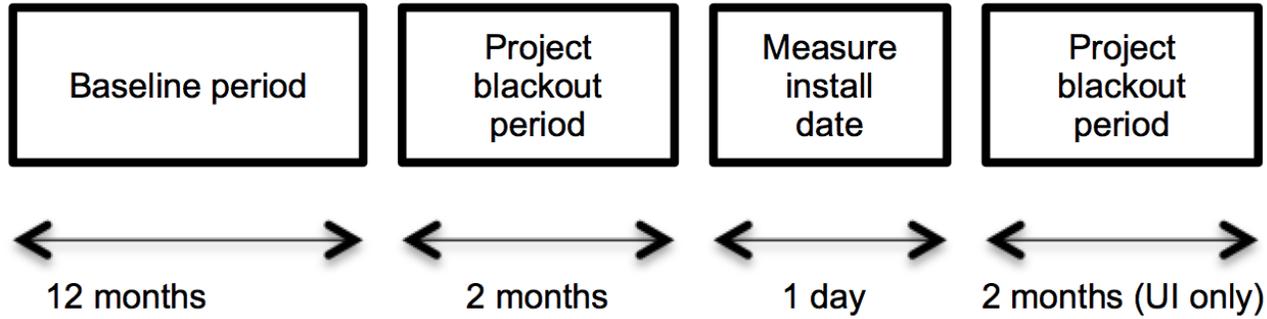
- Initiated 2017
- 28 Commercial pilot sites
- Objectives
 - How soon can we get an indication of savings?
 - How do advanced M&V savings compare to traditional estimation methods?
 - How does effort compare?



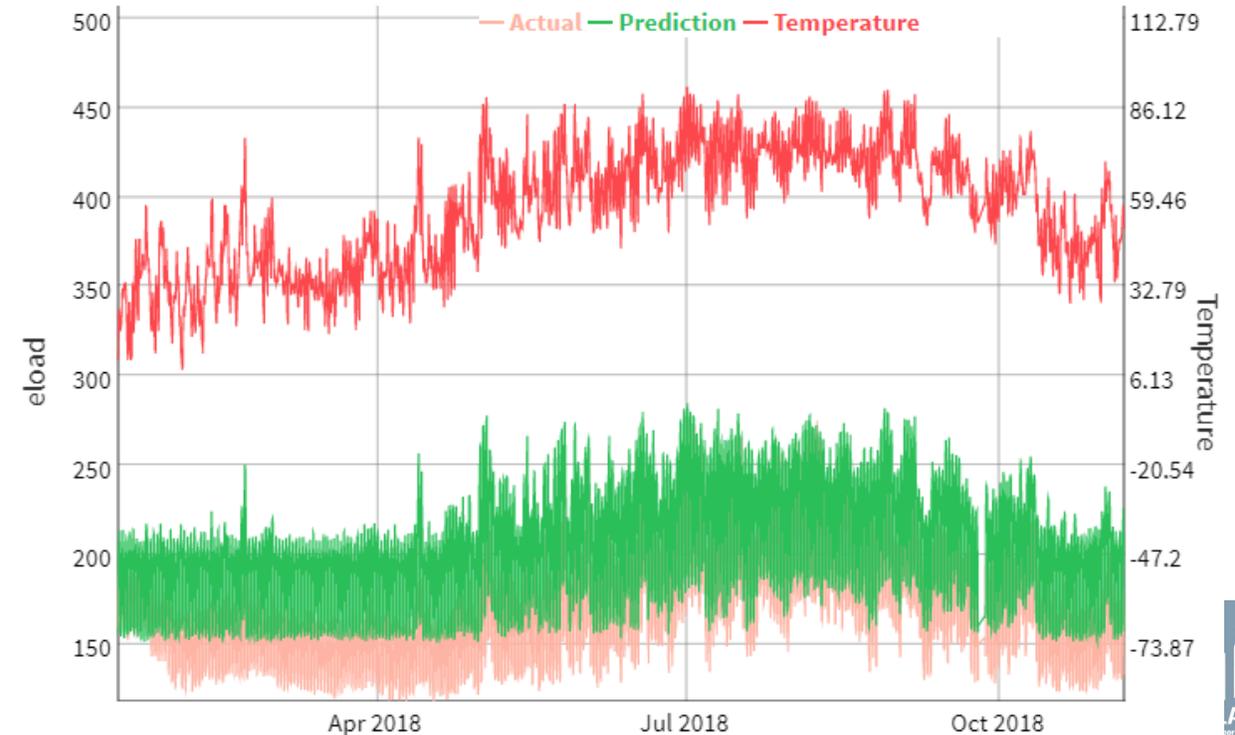
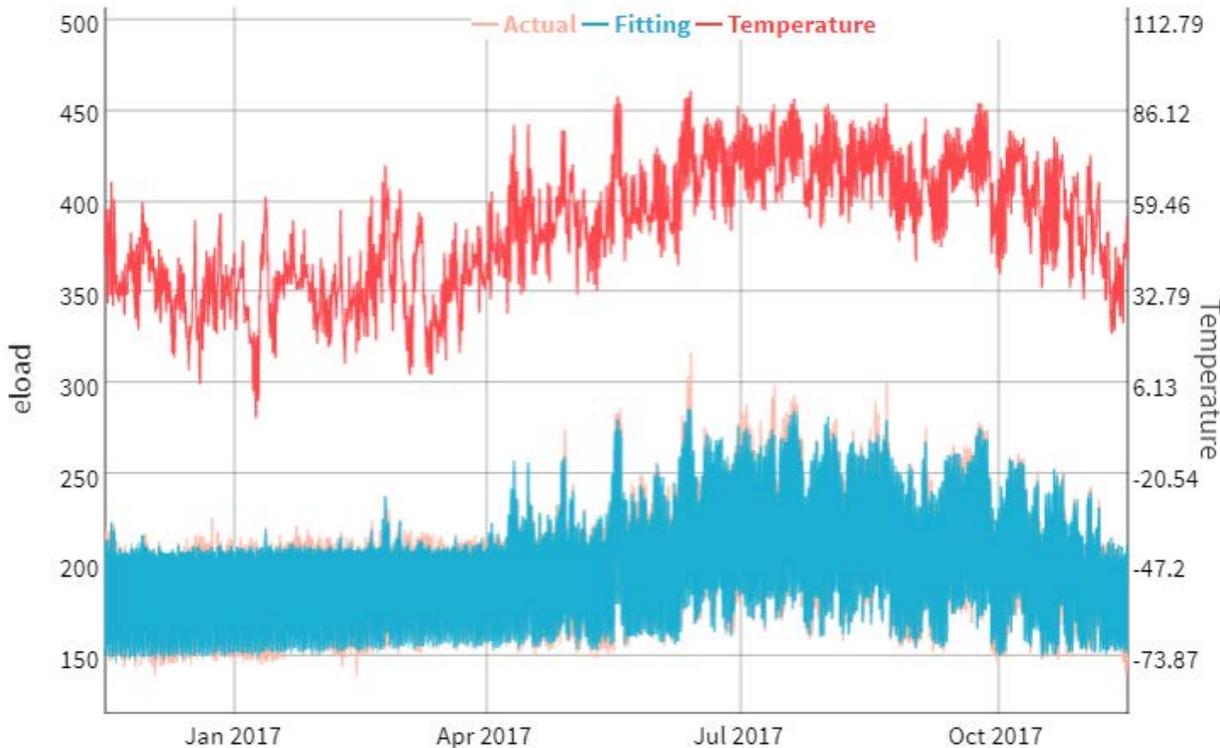
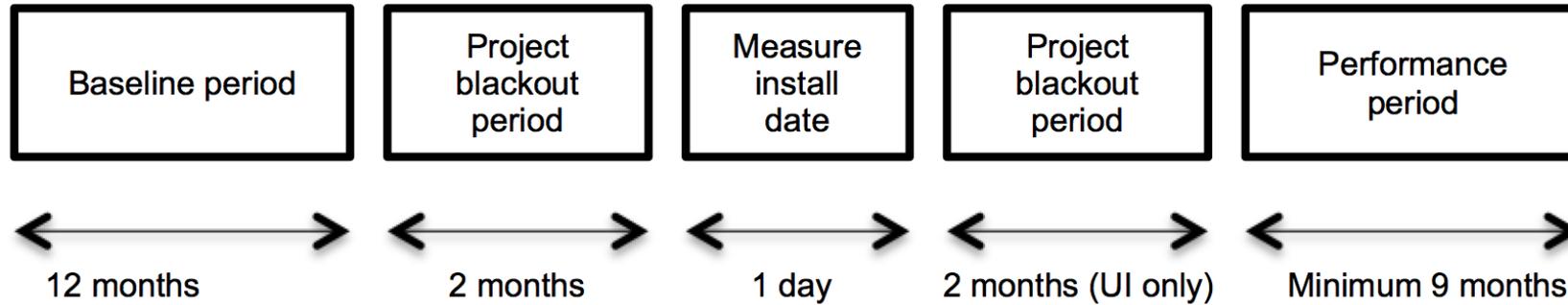
Pilot approach



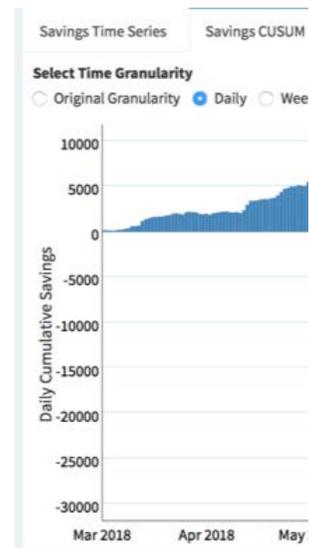
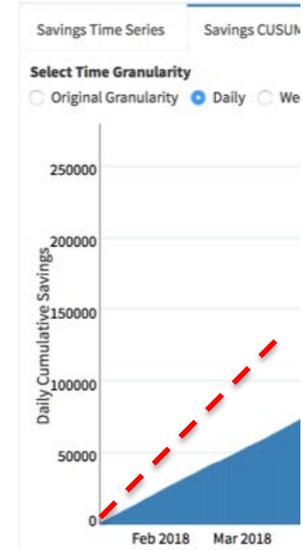
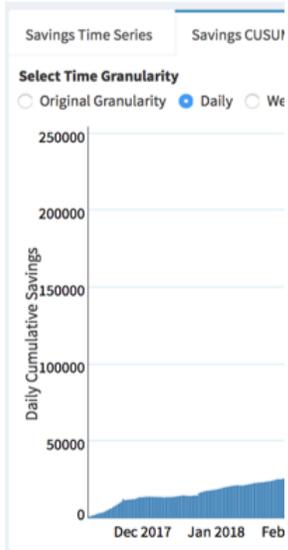
Pilot approach



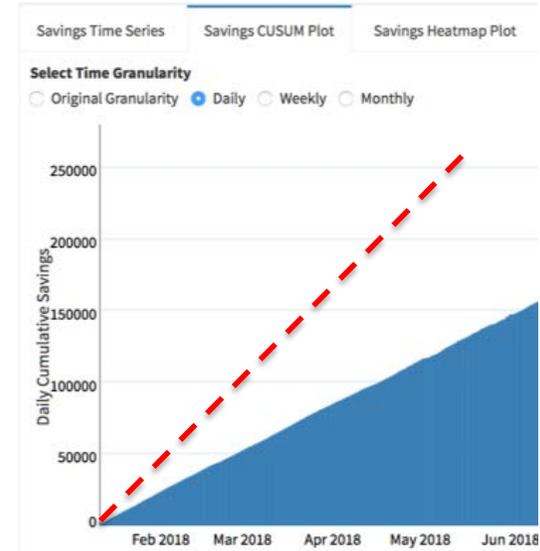
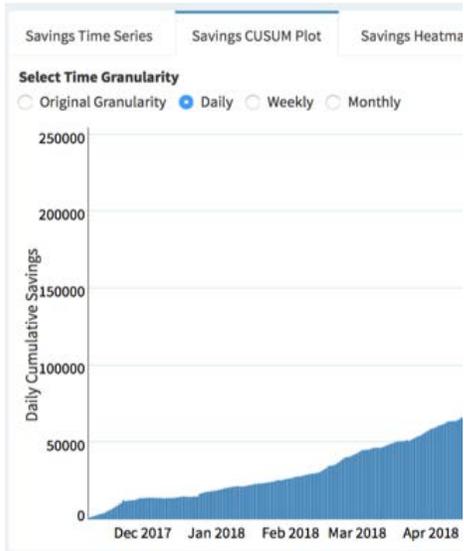
Pilot approach



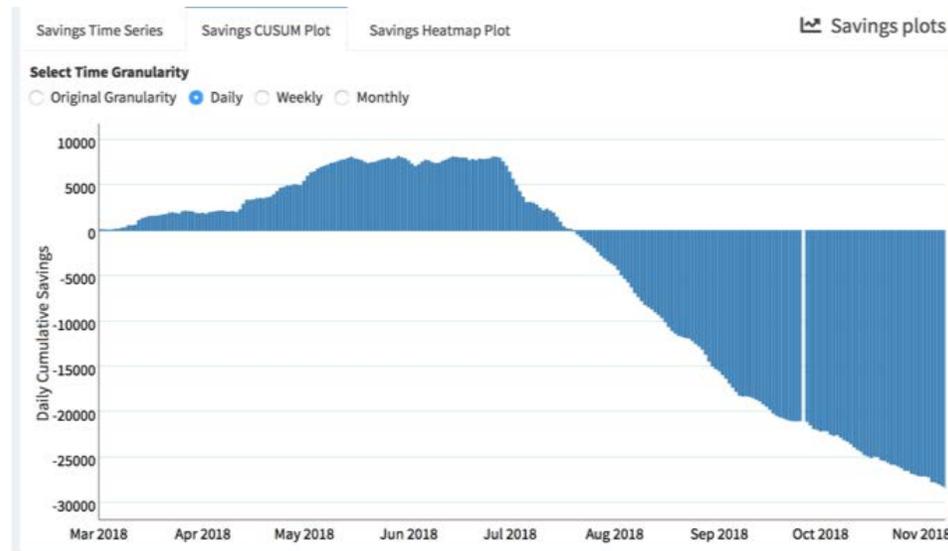
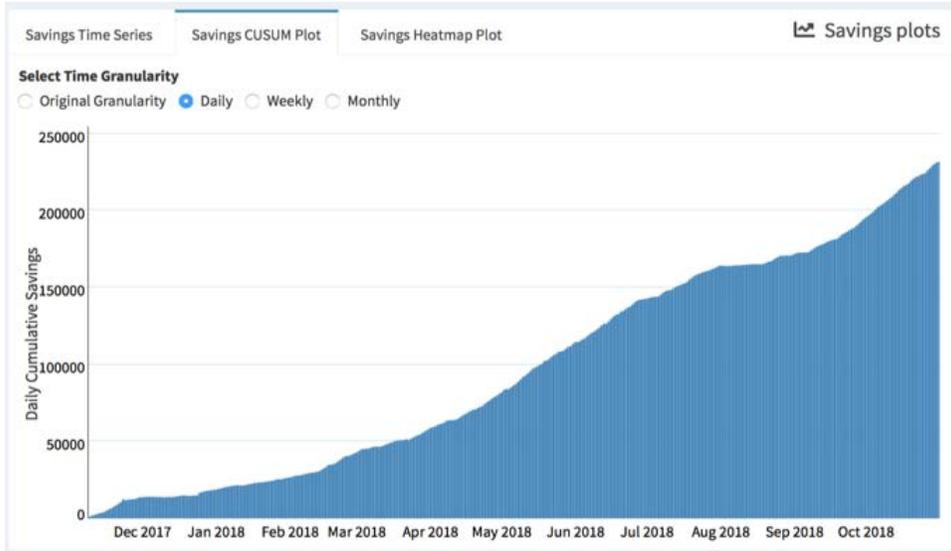
Lesson 1: Rapid feedback is possible



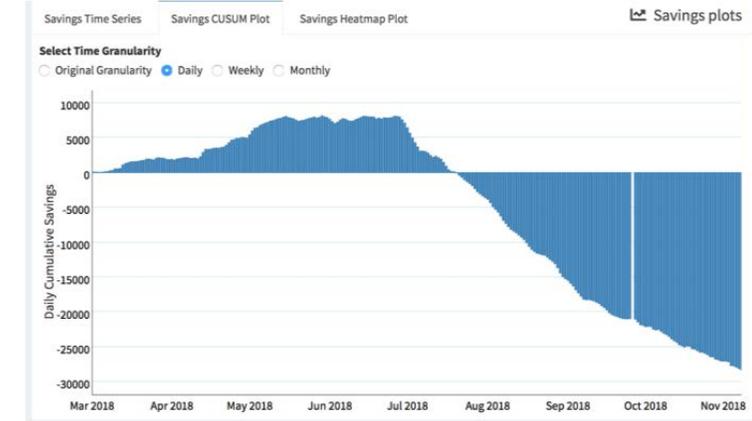
Lesson 1: Rapid feedback is possible



Lesson 1: Rapid feedback is possible



Lesson 2: Project classification can help manage risk



The Good

- $\pm 20\%$ vs. ex-ante
- 6 projects
- 84% realization rate

The Bad

- $>35\%$ below ex-ante
- 5 projects
- 55% realization rate

The Ugly

- $+253\%$ to -184%
- 9 projects
- 5% realization rate

Lesson 3: Advanced M&V effort level is low

Advanced M&V Activity	Average Time per Project (hours)	Percent of Total Time (%)
Data Processing	4.2	70%
Modeling	0.1	2%
Collating Results	1.7	28%
Total	6	100%

Expected Reductions in Effort When Scaled

- MDMS configured to provide consistent data, formatted and time-stamped as needed
- Streamlined process to allocate meters to buildings/projects and for logging key dates

- Implementers gain experience, reducing time to review savings estimates and make decisions.
- In some scenarios aggregation may reduce time spent reviewing individual project results.
- Automated tools to assist in identifying NREs, and make data-driven adjustments

Overarching Findings

- Tools and methods are ready to go
- Rapid feedback is feasible
- Project classification helps manage risk
- Advanced M&V is relatively low effort
- Data management is key (interval data and project dates)
- Time & experience needed to make judgment calls

Continuing Development

- Continue conversation on use cases for advanced M&V
- Continue R&D on non-routine events
 - Define thresholds for action
 - Build catalog of buildings' data with documented NREs
 - Test data-driven adjustment methods on simulated & real data
- Develop methods to address uncertainty
- Assess applications for time-sensitive valuation



Eliot Crowe, ecrowe@lbl.gov

Jessica Granderson, PhD, jgranderson@lbl.gov

Samuel Fernandes, sgfernandes@lbl.gov

Samir Touzani, stouzani@lbl.gov