Workshop on M&V2.0 in New Hampshire: Connecticut Pilots, Outreach, and Other Related R&D

Hosted by NH EM&V Working Group

In partnership with Michele Melley, CT DEEP Project Manager

And M&V2.0 Project team

December 3, 2019

Connecticut Department of ENERGY & ENVIRONMENTAL PROTECTION

BERKELEY LAB
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Welcome and Introductions

Agenda

1:00 Welcome and Introductions, *Miles Ingram*

1:10 Project Overview, *Michele Melley*

1: 25 Pilots and Q&A:

- C&I Pilot, *Eliot Crowe*
- Residential Pilot, *Michele Melley, Miles Ingram, Recurve*

2:15 NH Considerations – Open Discussion

3:00 Adjourn

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Advanced M&V (a.k.a. M&V 2.0) Defined

Definition: "the use of automated analytics in combination with higher granularity data to quantify project or program energy savings." (Lawrence Berkeley National Laboratory)

- Is it a tool for evaluation, or a tool for implementation? **YES**
- Is it a tool for program administrators? Third party evaluators? Regulators/stakeholders? **YES**
- Is it a replacement for EM&V? **NO**
- If it were a food, what food would it be? **BACON** (it tastes good on just about anything)

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PROTECTION

Project Overview: Standardized, Sustainable and Transparent EM&V – Integrating New Approaches in Connecticut

Michele Melley

Advanced M&V-NH State Partner Workshop

Dec 3, 2019

Standardized, Sustainable and Transparent EM&V- Integrating New Approaches in Connecticut

Funding:

DOE Funding: Office of Energy Efficiency Renewable Energy.
Cost Match: Project Partners

Project Goals:

This project will test the use of advanced data analytics and collection tools (M&V 2.0) through a statewide pilot and compare these findings with traditional M&V practices.
The project team will transfer those results and experiences to other states along with additional EM&V 2.0 research and experiences from across the country.

Impact:

- Develop M&V 2.0 software tool standards and protocols
- Broad scale adoption and use of M&V 2.0 tools in CT based on pilot results
- State and regional education on automated versus traditional approaches to EM&V

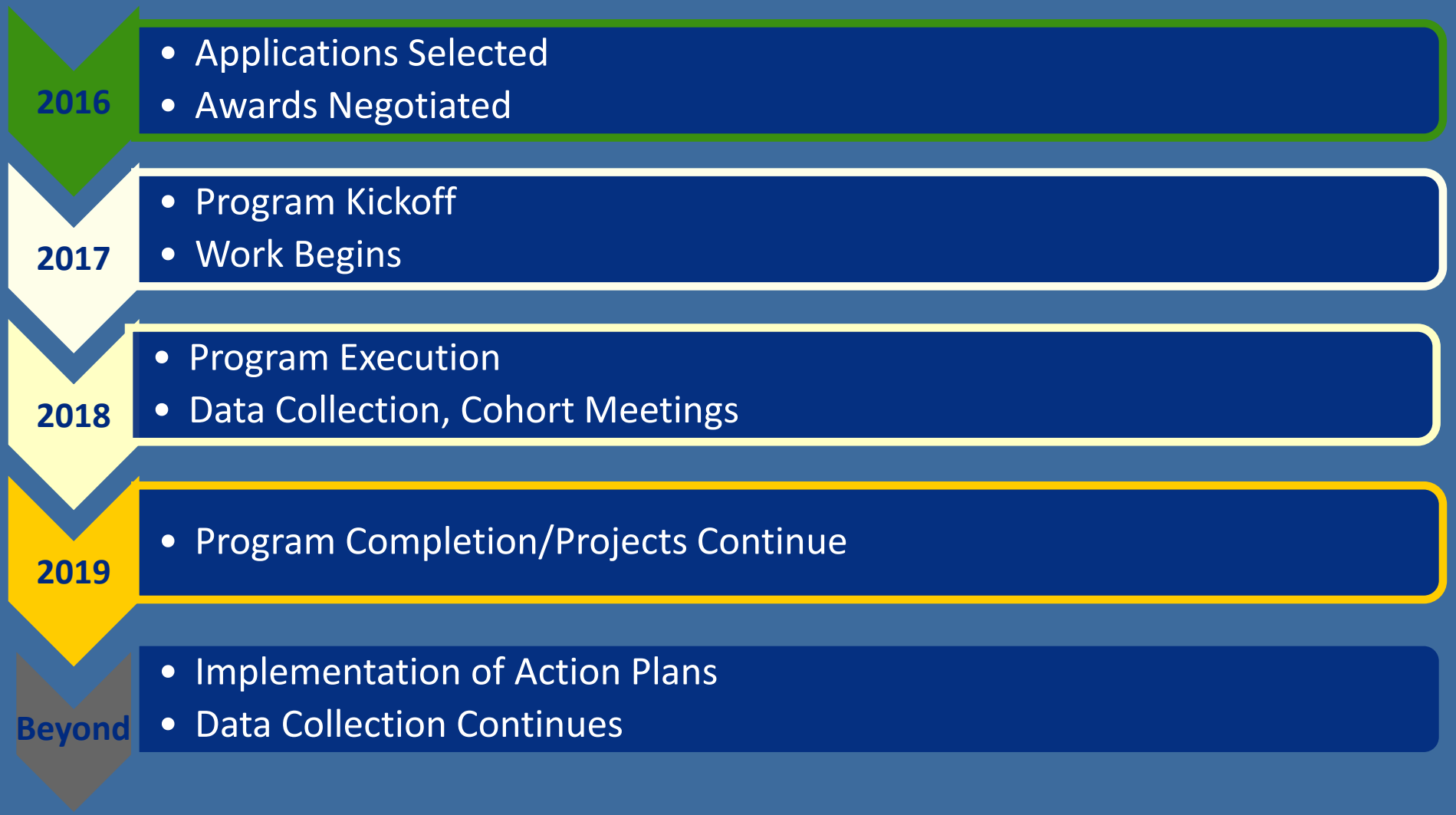
Partners:

- NH, NY, RI, VT, NEEP, LBNL
- Eversource Connecticut (utility)
- United Illuminating (utility)

Stakeholders:

- State energy offices, regulators, utilities, program administrators, evaluators, system planners, facility managers

3- Year Grant/Project



CT TEAM-Key Roles/Contacts

CT DEEP

Michele Melley, Project Manager

- Grant recipient, overall project management, participate in pilot work, DOE reporting;

NEEP

Elizabeth Titus, Giselle Procaccianti

- Outreach, disseminate information, lead/convene regional workshops;

LBNL

Jessica Granderson PhD, Eliot Crowe, Sam Fernandes

- Implement pilot/conduct advanced data analytics via LBNL M&V tool. Technical Advisor

CT Utilities- Eversource/UI

Miles Ingram, Dick Oswald

- Implement pilot, manage continuous M&V on buildings, comparative M&V analysis.

CT Advanced M&V Pilot: Status

Commercial Pilot-Completed

- Targeted 2-3 Dozen Commercial Buildings
- AMI Data
- RCx, Energy Opportunities, SBEA
- Compared Advanced M&V to “ex ante” –savings estimates, time and cost.

CT Advanced M&V Pilot: Status

Commercial Pilot- Completed

Resources/Deliverables-

- Utilities Traditional Savings Memo
- LBNL'S Implementation Resource Guide
- Pilot Results Memo-Coming Soon
- State Partner Workshops – Vermont and R.I. Completed
- Outreach Plan
- Research Briefs/Guidance – See links
- Webinars and Public Workshops – See links

CT Commercial Pilot: Transfer Tool to Industry

PROGRESS-Closure

Utilities-Considering Use of Tool in Implementation Phase

Project Criteria: expected savings > 5%, retrofit baseline, no DG

LBNL-Trained CT Utility Staff

CT Residential Pilot: Moving Ahead

Residential Pilot status will be discussed later in this Workshop

Links to Project Webinars and Workshops

- "Rapid Fire" Software Webinar (Software Webinar - Tools and Trends Toward Advanced M&V)
- Webinar Demo of LBNL M&V Software (Webinar Demo of LBNL Software)
- P4P Webinar (P4P Primer)
- Is P4P Performing? 2019 Webinar Is P4P Performing?)
- 2019 Meeting/Workshop (Stellar EM&V - RI)
- 2018 Workshop (Evolving the Paradigms - VT)
- 2017 Workshop (Many Flavors of Advanced M&V -CT)

Links to Other Project Resources

- Advanced Building Analytics Tools List
- Quarterly EM&V Newsletters
- 2019 IEPEC Paper on the C&I Pilot
- 2018/19 Brief: Readiness for Advanced M&V in the Northeast
- 2017 Brief: How Fast is EM&V Changing?
- August 2017 Brief: An Evolving Industry
- 2016 White Paper: The Changing Paradigm

THANK YOU

- Michele Melley
- Michele.L.Melley@CT.gov
- 860-827-2621

The Connecticut C&I Pilot

Connecticut Advanced M&V Commercial Pilot

Eliot Crowe

Lawrence Berkeley National Laboratory

Background

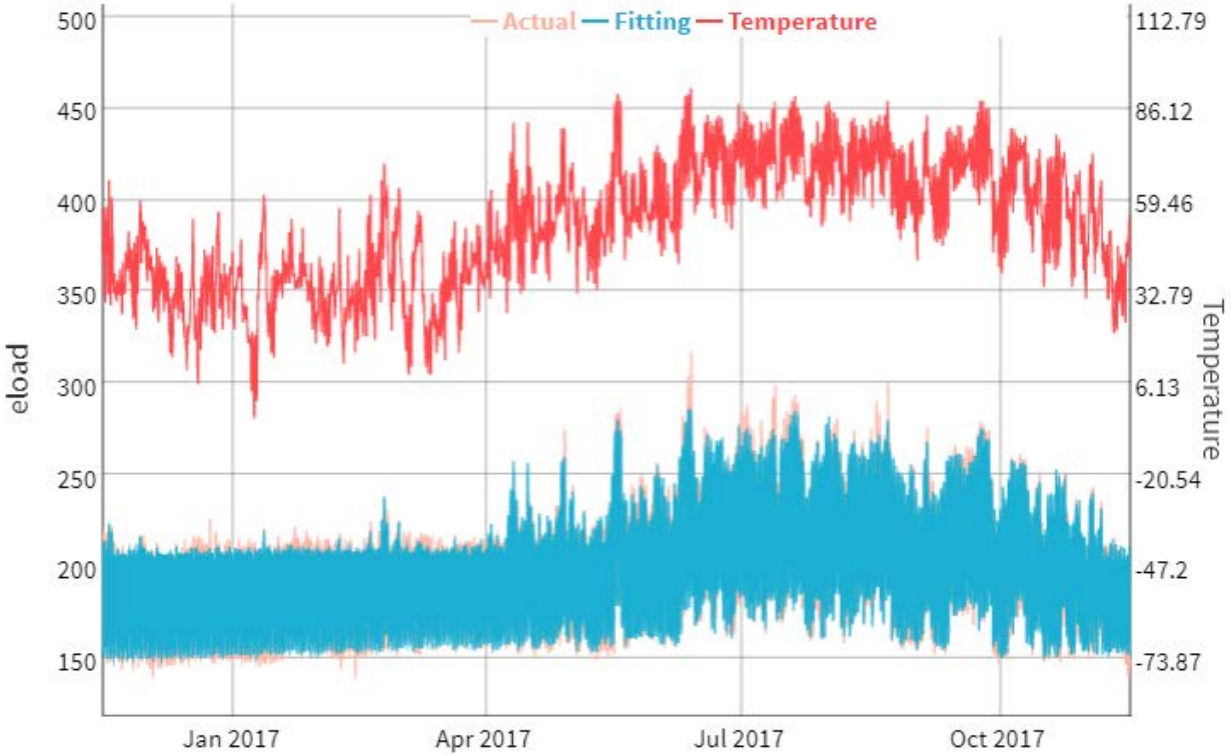
Pilot Overview

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

Advanced M&V Use Cases

- P4P (utility or ESCO)
- Utility embedded M&V
- Third party embedded EM&V
- Aggregated program approaches
- Aggregated grid-level analysis
- Owner-driven performance monitoring

Pilot approach



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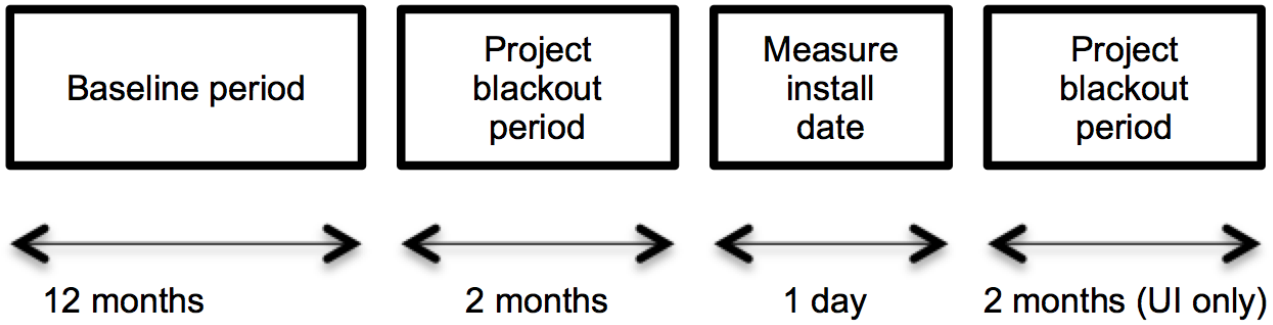
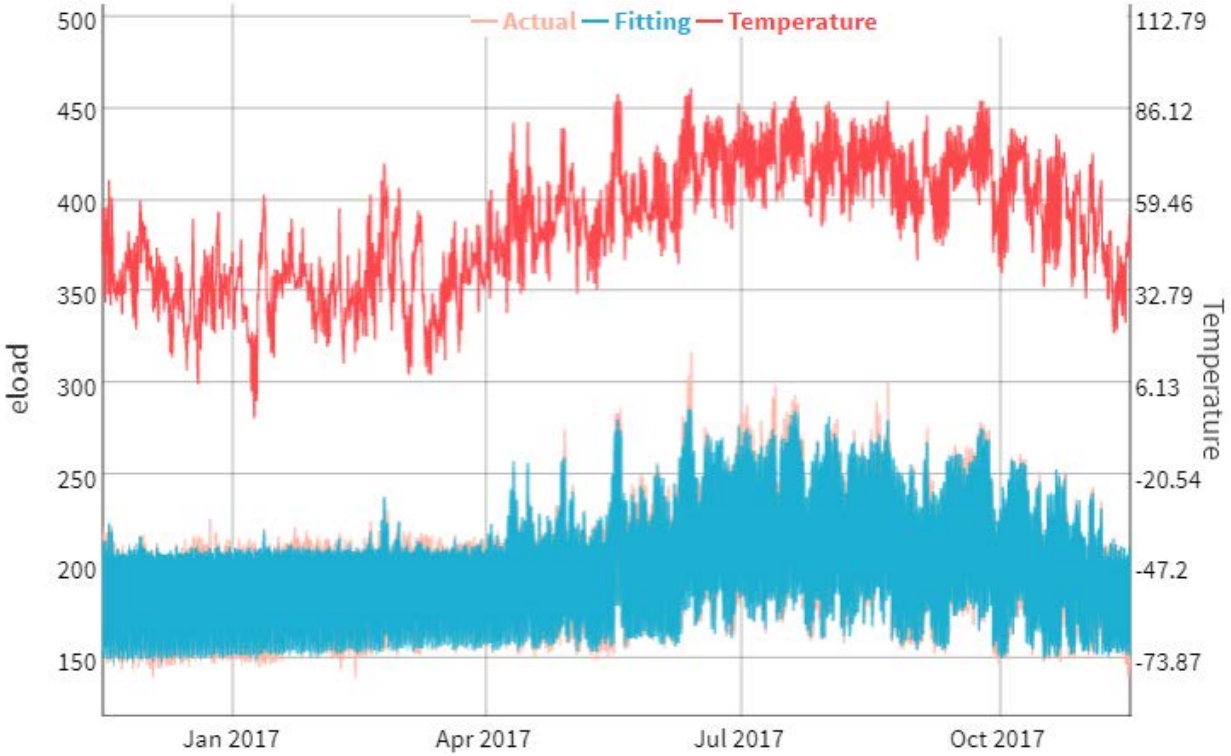
Pilot approach





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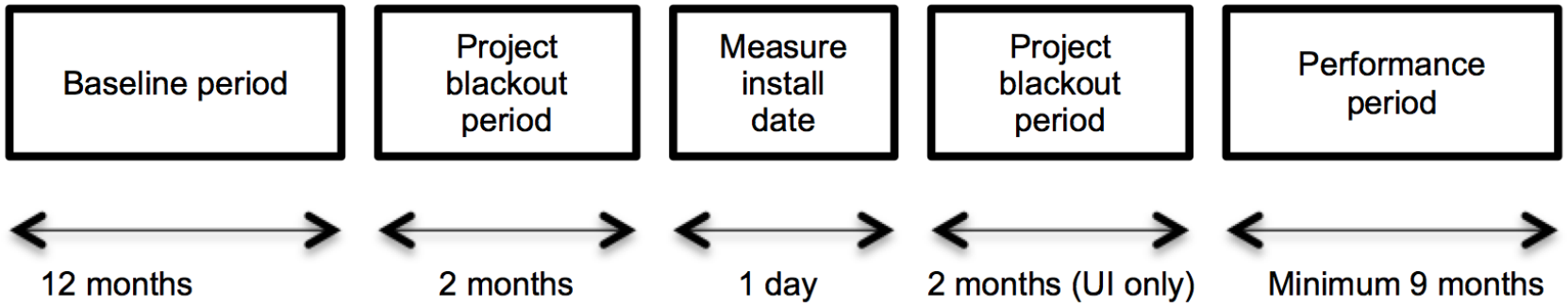
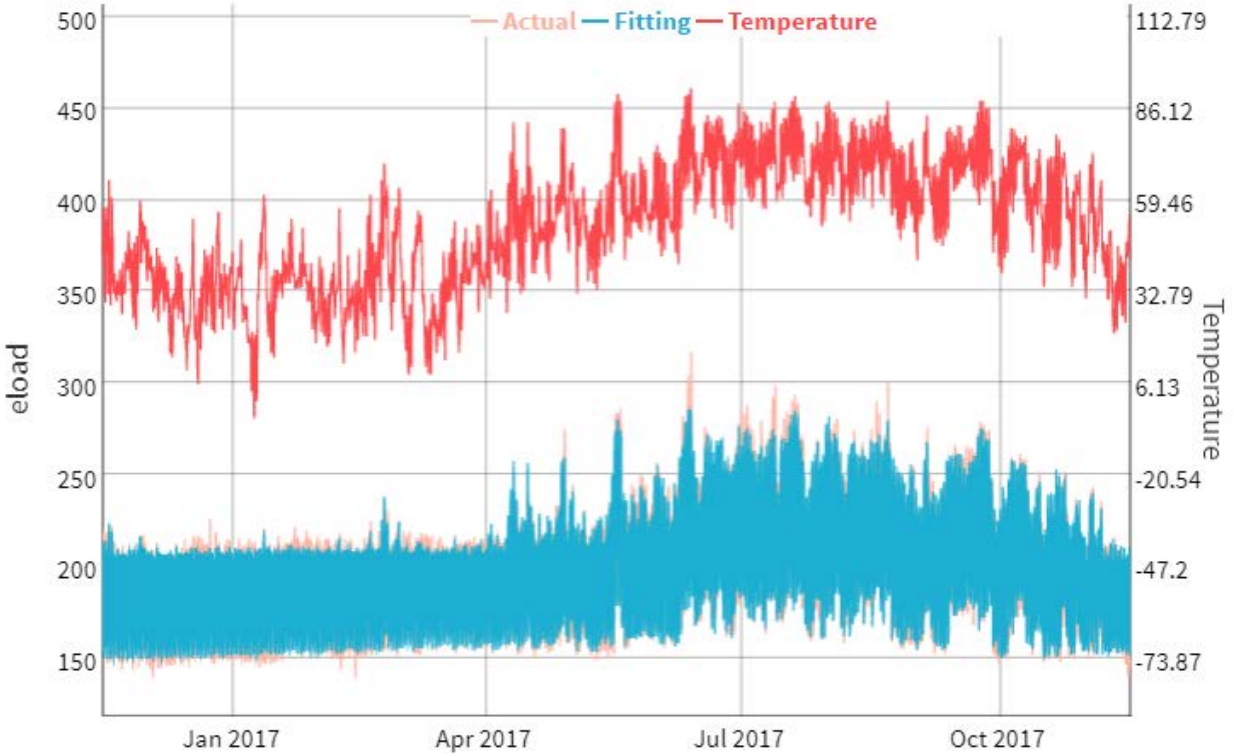
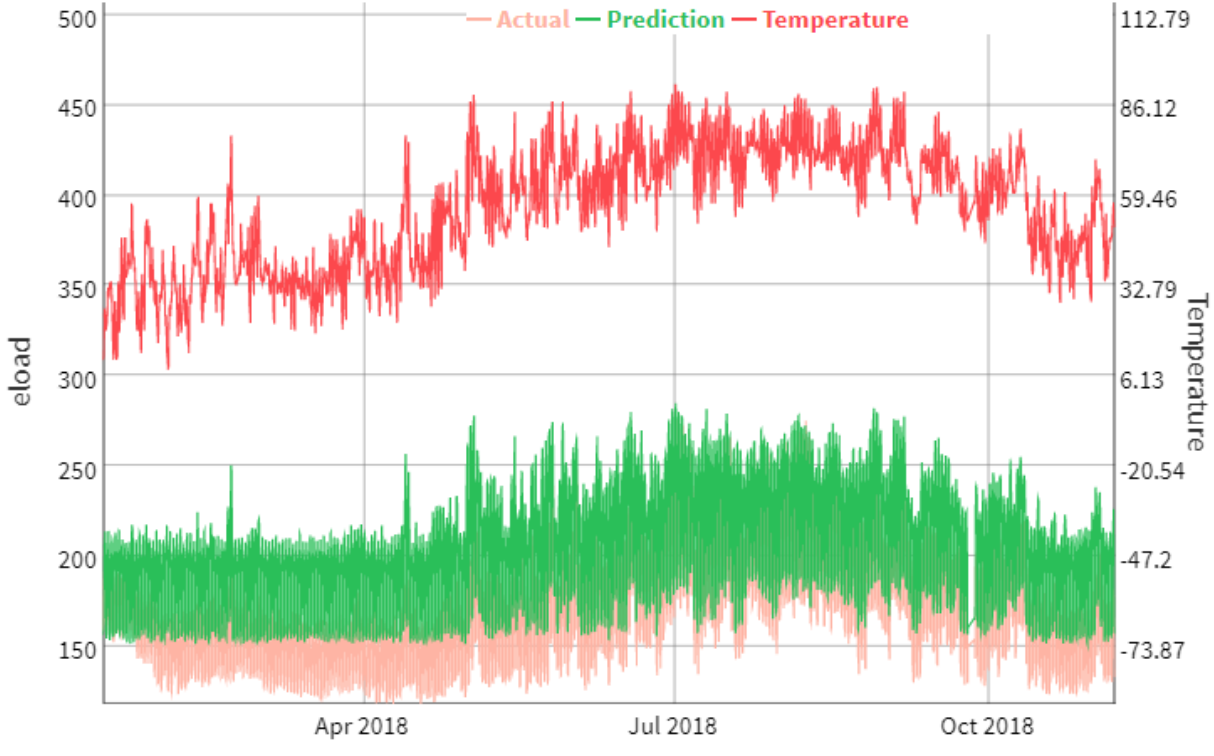
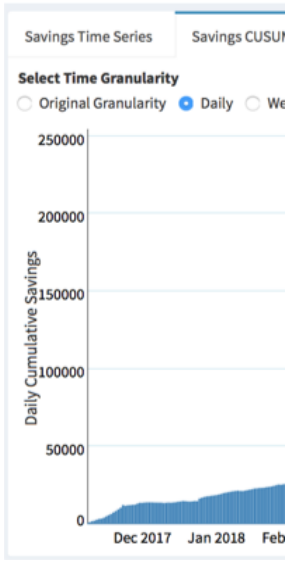
Pilot approach

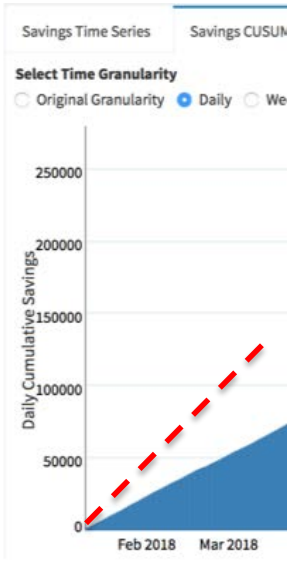


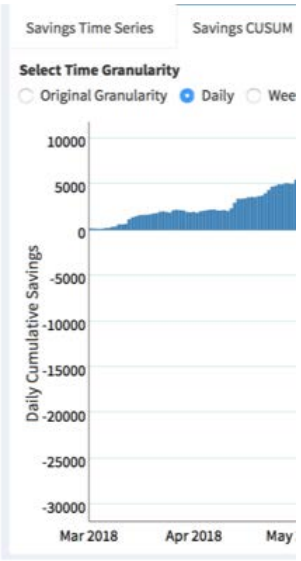




Results: Rapid feedback on savings







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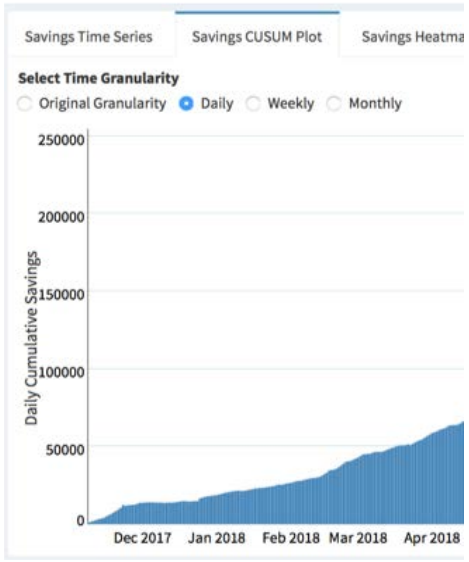

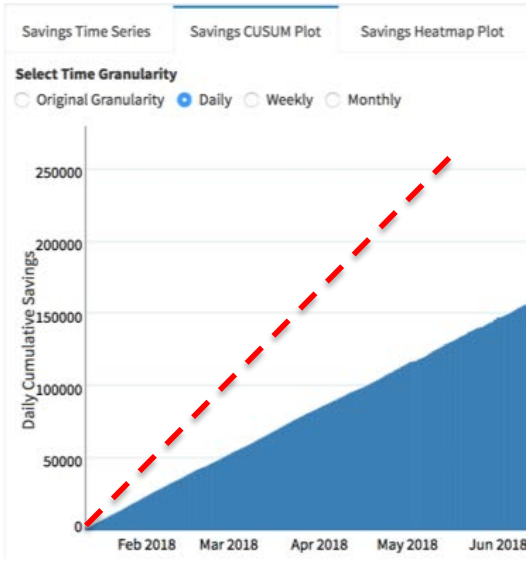

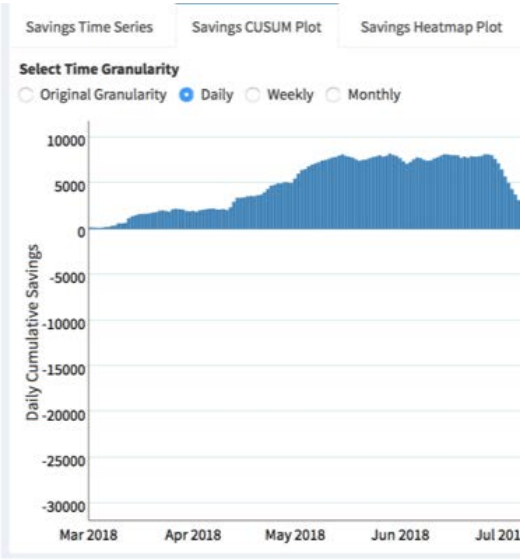

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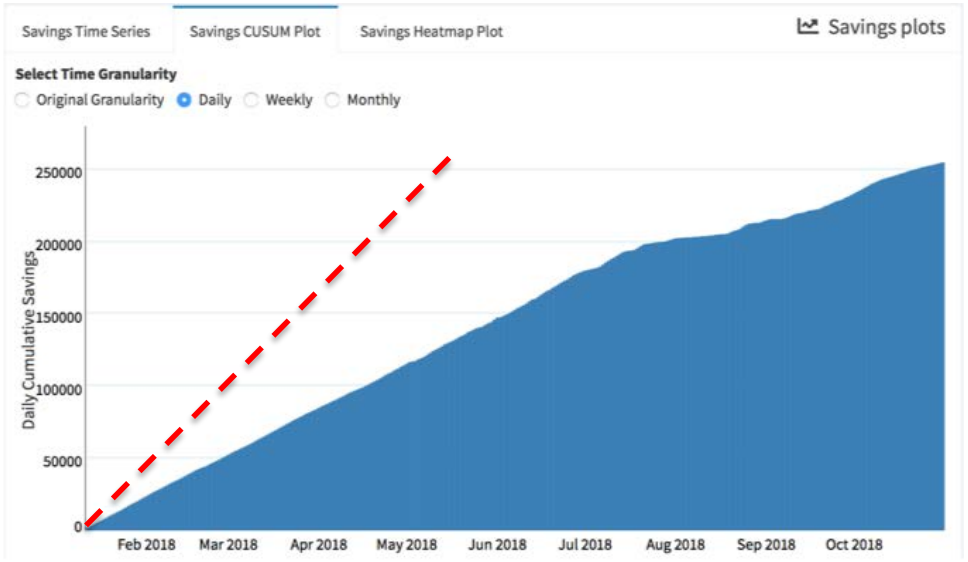
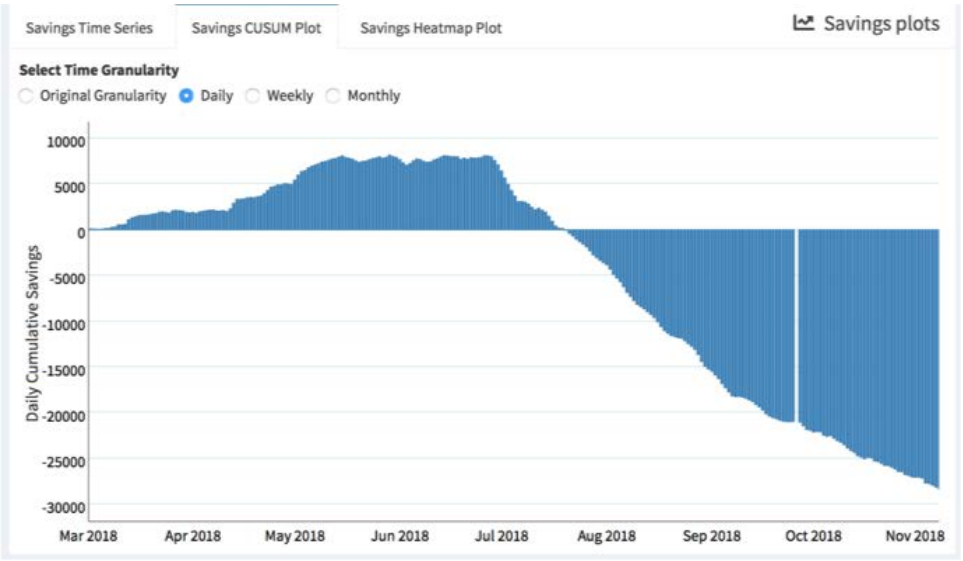
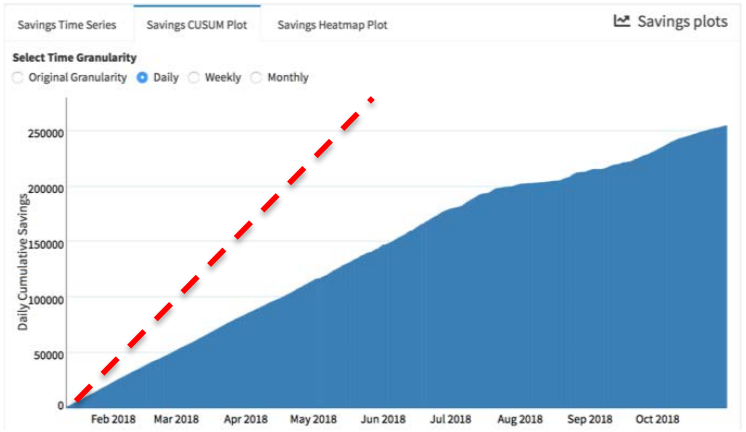
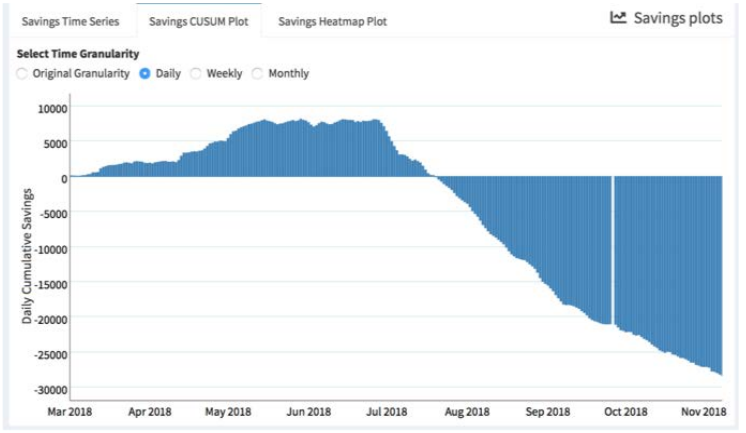




Observed results compared to ex-ante claims





The Good

- ±20% vs. ex-ante
- 6 projects
- 84% realization rate

The Odd

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

The ??

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

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

Connecticut Residential Pilot

CT Advanced M&V Residential Pilot: Status

Residential Pilot- Implementation Phase

Scope:

- Targeting ~ 2,000-3,000 CT “HES” homes
- Monthly Consumption Data- (not AMI)
- Compare the advanced M&V to “Traditional” approaches–billing analysis, time/costs.
- NEEP will track the process of using these tools and share results with states.

CT Advanced M&V Residential Pilot

NEXT STEPS

- **Recurve-**
  - Complete Analysis of HES data using Advanced M&V tool
  - Document Pilot Design and Findings
- CT Utilities, DEEP, LBNL

  -Draft Residential Pilot Findings memo
- CT Utilities – contract with Advanced M&V Vendor
  - Use tool in Program Implementation Phase

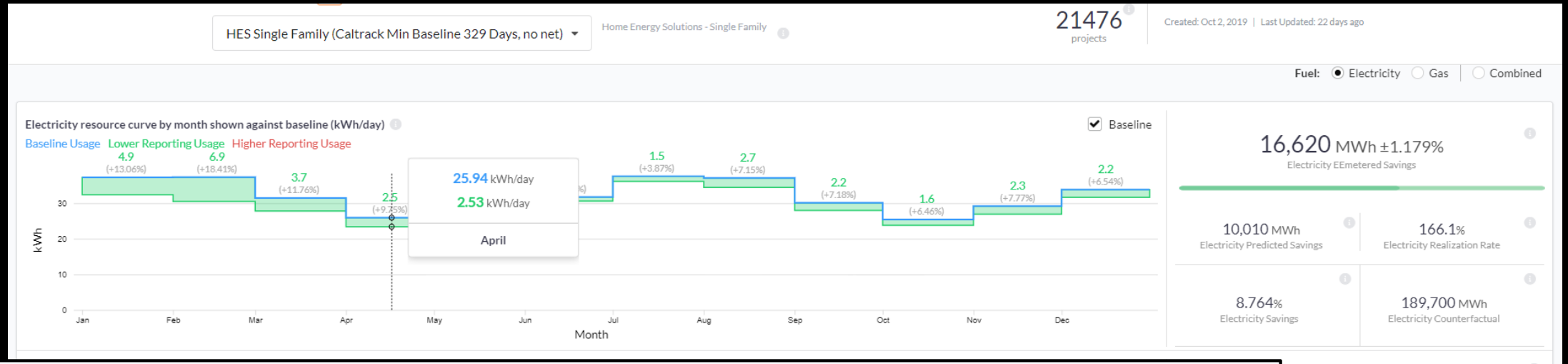
Advanced M&V: Relevance to Future Program Implementation in CT

2020 implementation use case: CT Home Energy Solutions (HES) and HES-Income Eligible (HES-IE) Program

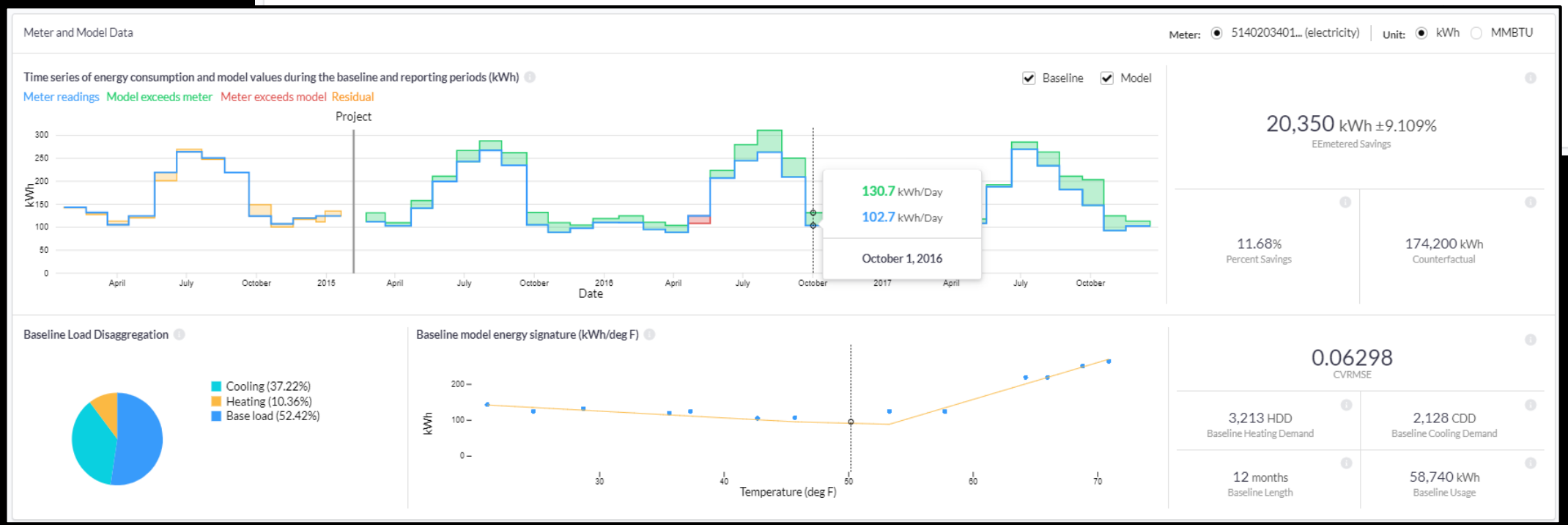
- Targeted marketing and pre-screening
- Vendor oversight & management
- Understand other savings drivers

Recurve Platform Overview

Portfolio view

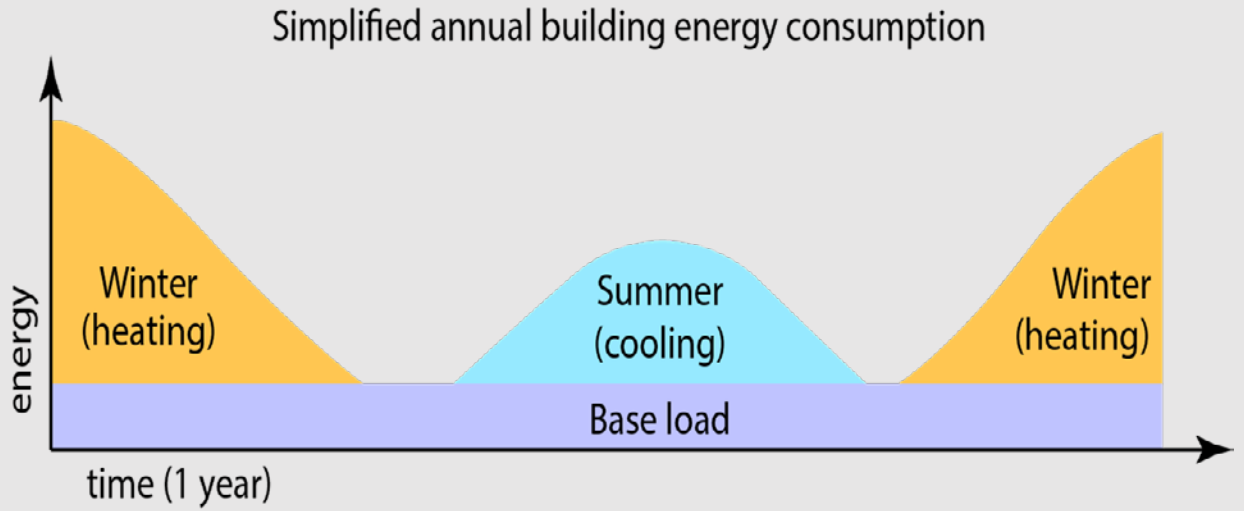


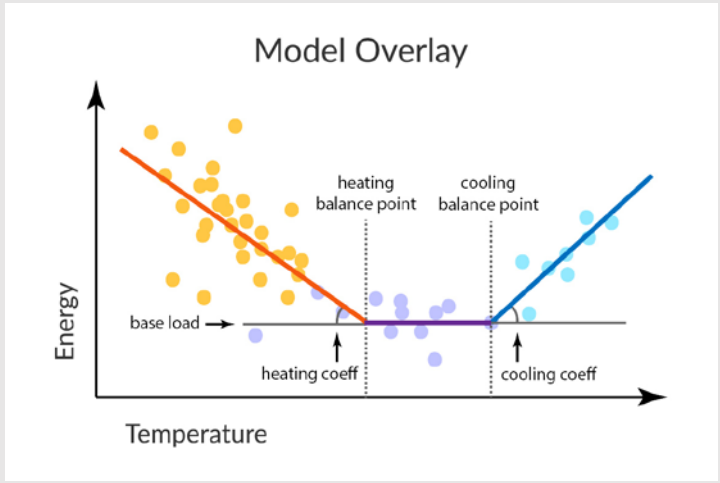
Project view



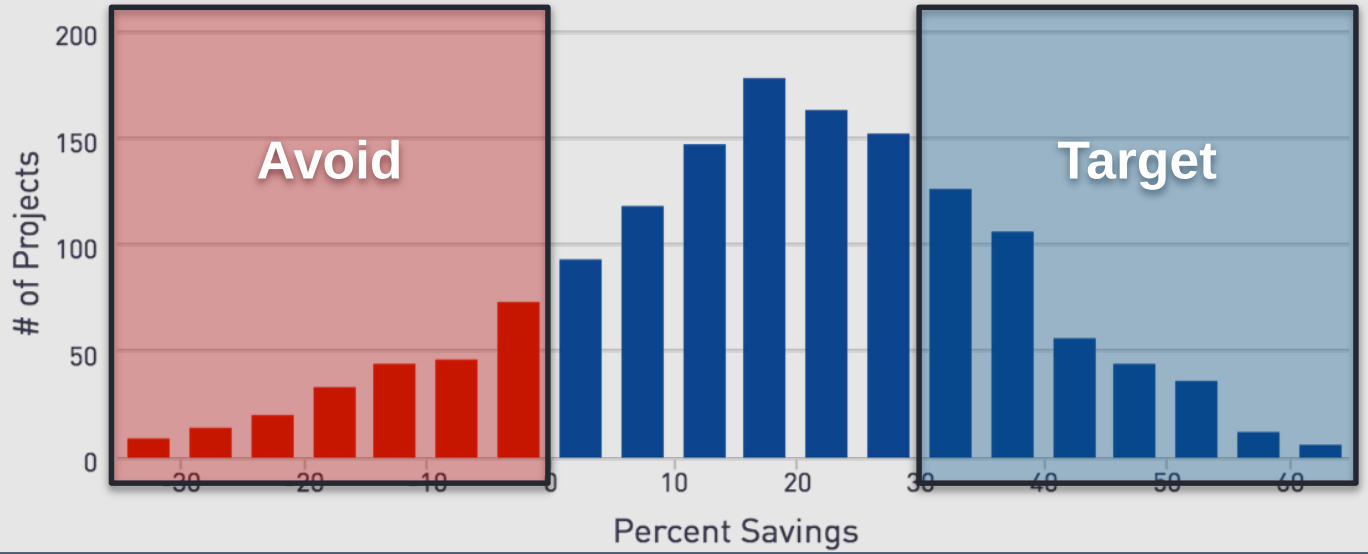
Example:
Targeted Marketing and Pre-screening

Target based on consumption profile



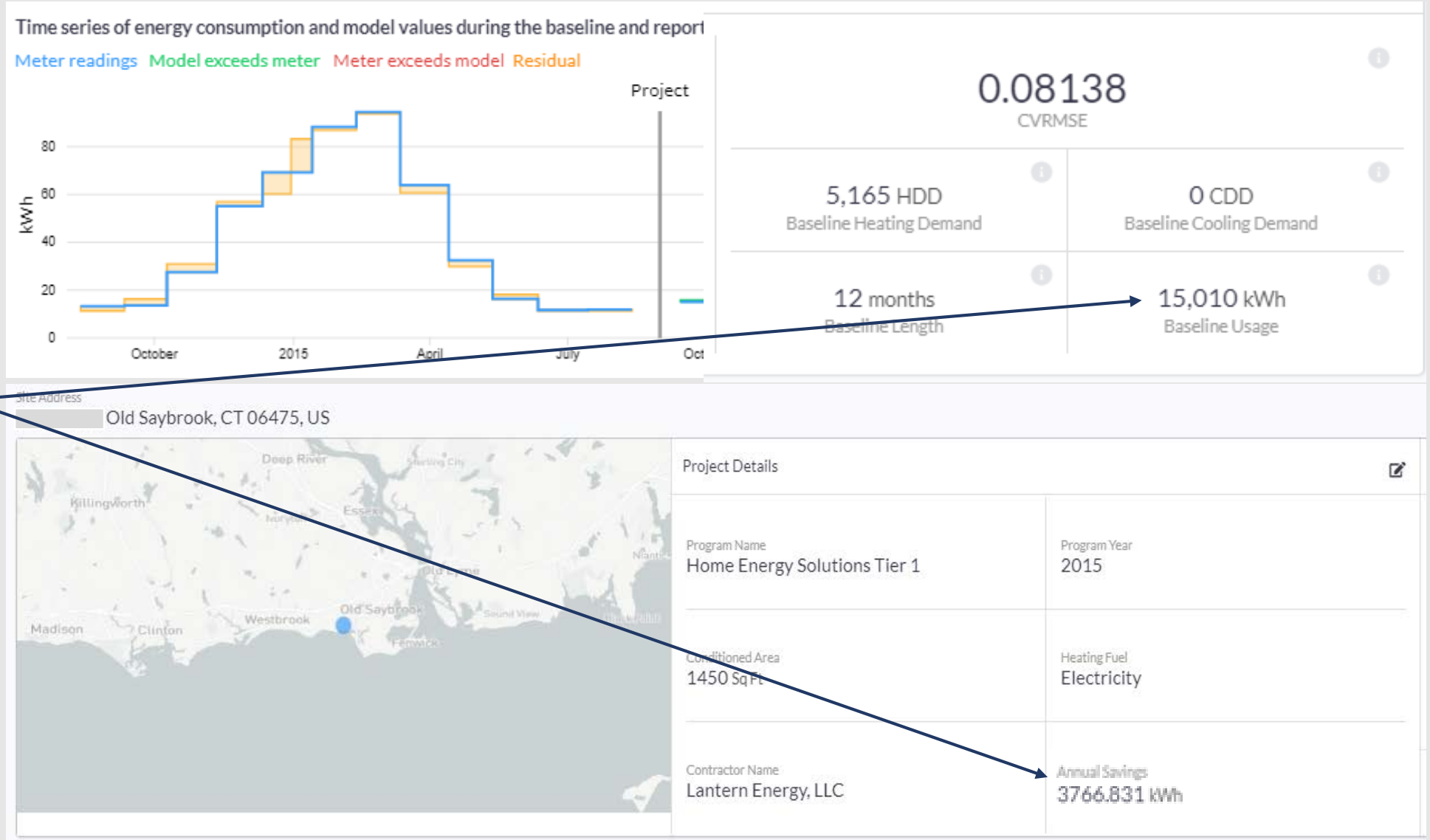


Target based on past performance (e.g., by census tract or other characteristics)



Example:
Targeted Marketing and Pre-screening

Pre-screen based on proposed savings as % of annual consumption



Example:
Vendor Oversight and Management

Cohorts

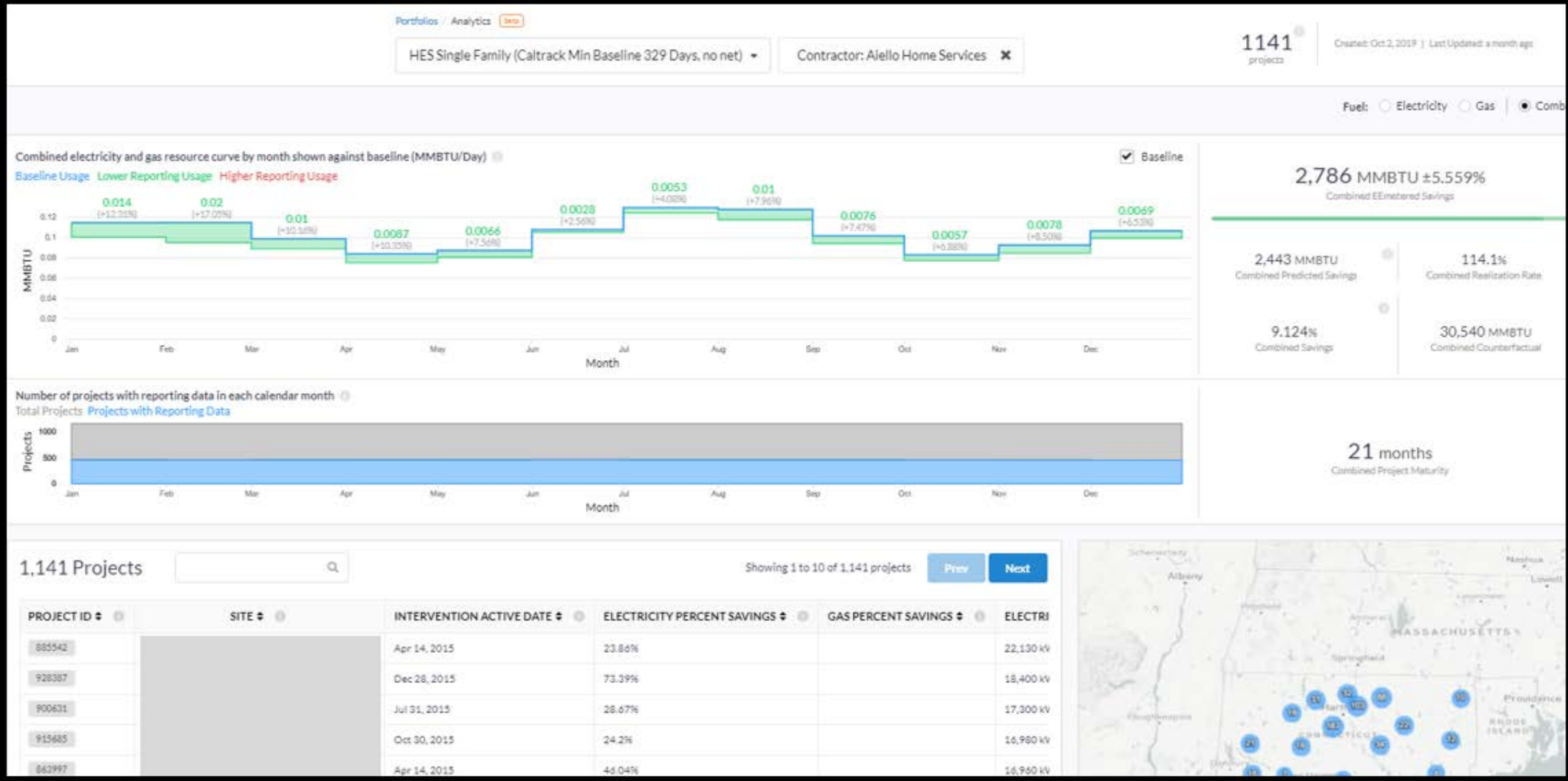
47 Contractor

COHORT	PROJECTS	AVERAGE PROJECT MATURITY	ELECTRICITY PERCENT SAVINGS	GAS PERCENT SAVINGS	ELECTRICITY SAVINGS
ACCESS	4	16 months	0.8382%		89.38 kWh
AC Development	16	29 months	2.535%		3,880 kWh
AC Development, LLC	16	13 months	6.742%		5,477 kWh
Aiello Home Services	1141	21 months	9.124%		816,600 kWh
A Plus Installation, LLC	507	24 months	9.382%		518,600 kWh

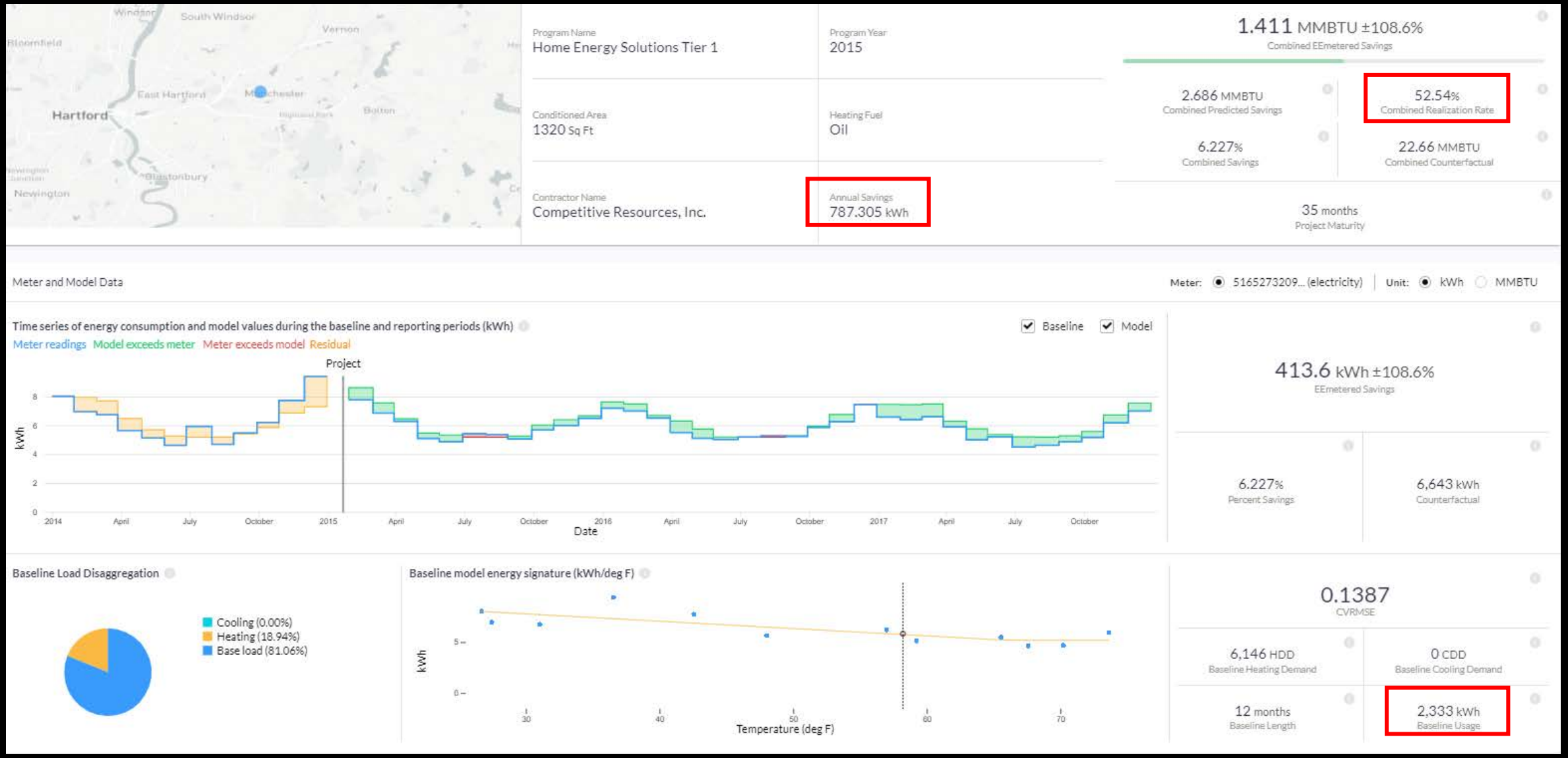
2 Program Year

COHORT	PROJECTS	AVERAGE PROJECT MATURITY	ELECTRICITY PERCENT SAVINGS	GAS PERCENT SAVINGS	ELECTRICITY SAVINGS
2015	11243	29 months	9.456%		12,230,000 kWh
2016	10233	16 months	7.279%		4,392,000 kWh

Example:
Vendor Oversight and Management



Example:
Understanding Savings Drivers



Example:
Understanding Savings Drivers

Program Name
Home Energy Solutions Tier 1

Program Year
2015

Conditioned Area
2650 Sq Ft

Heating Fuel
Oil

Contractor Name
Lantern Energy, LLC

Annual Savings
1050.416 kWh

-26.06 MMBTU ±5.157%
Combined EEmetered Savings

3.584 MMBTU
Combined Predicted Savings

-727.2%
Combined Realization Rate

-35.74%
Combined Savings

72.92 MMBTU
Combined Counterfactual

32 months
Project Maturity

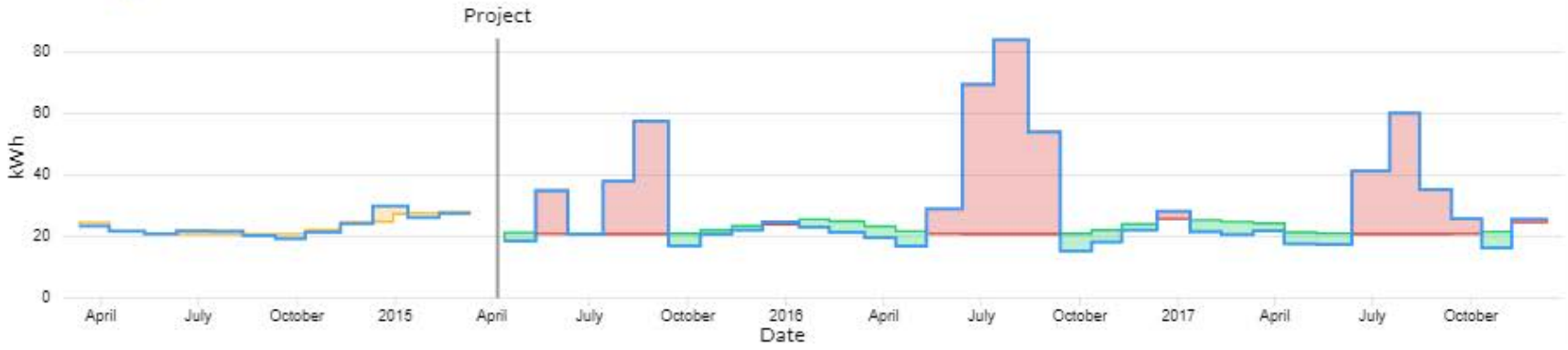
Meter and Model Data

Meter: 5139712307... (electricity) | Unit: kWh MMBTU

Time series of energy consumption and model values during the baseline and reporting periods (kWh)

Baseline Model

Meter readings Model exceeds meter Meter exceeds model Residual

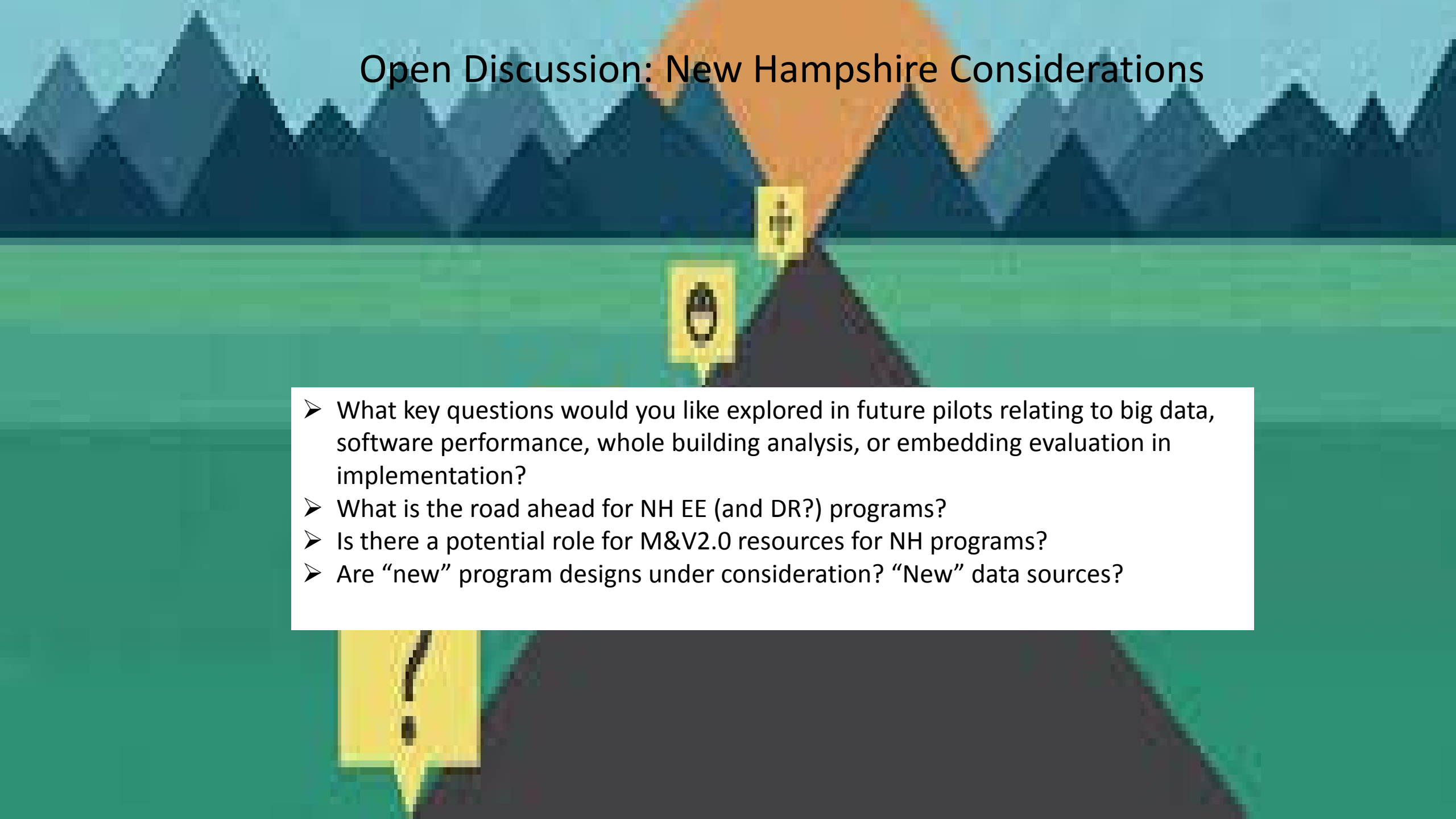


-7,638 kWh ±5.157%
EEmetered Savings

-35.74%
Percent Savings

21,370 kWh
Counterfactual

Open Discussion: New Hampshire Considerations



- What key questions would you like explored in future pilots relating to big data, software performance, whole building analysis, or embedding evaluation in implementation?
- What is the road ahead for NH EE (and DR?) programs?
- Is there a potential role for M&V2.0 resources for NH programs?
- Are “new” program designs under consideration? “New” data sources?

THANK YOU

For more information:

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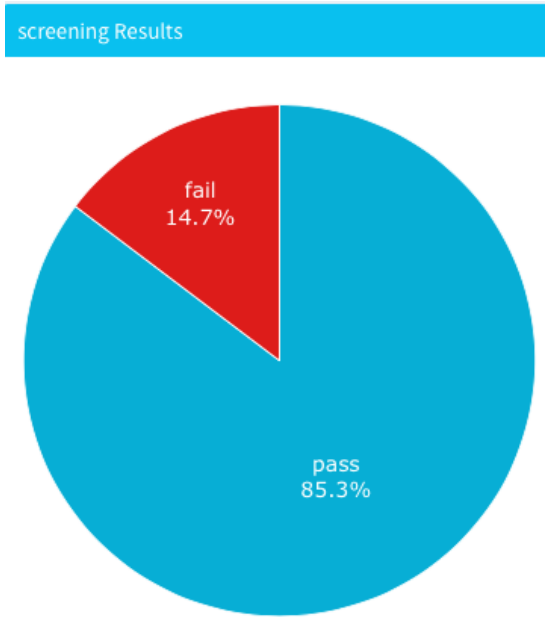
Bonus Slides

Ongoing LBNL R&D:
Seattle M&V Pilot

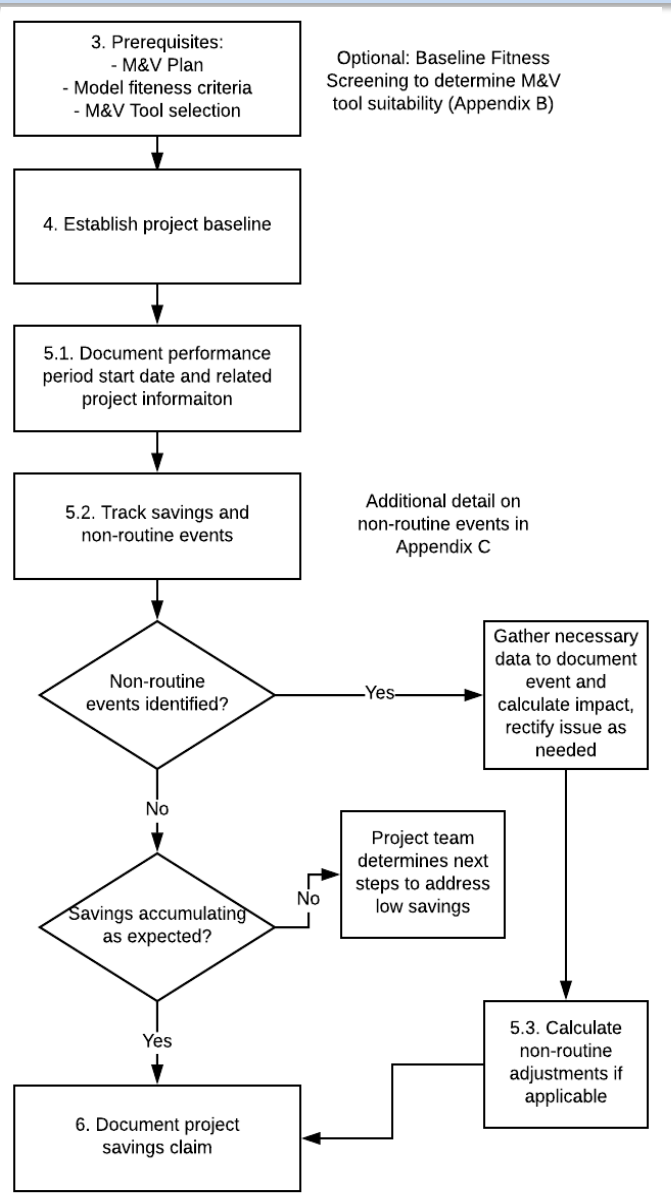
Seattle Pilot

- Commercial buildings
- M&V method validated on a dataset of 375 sites
- Projects under consideration
  - Active (RCx/Tune-up/Retrofit)
  - Completed
  - P4P program leads
- Seattle City Light staff trained on M&V Tool



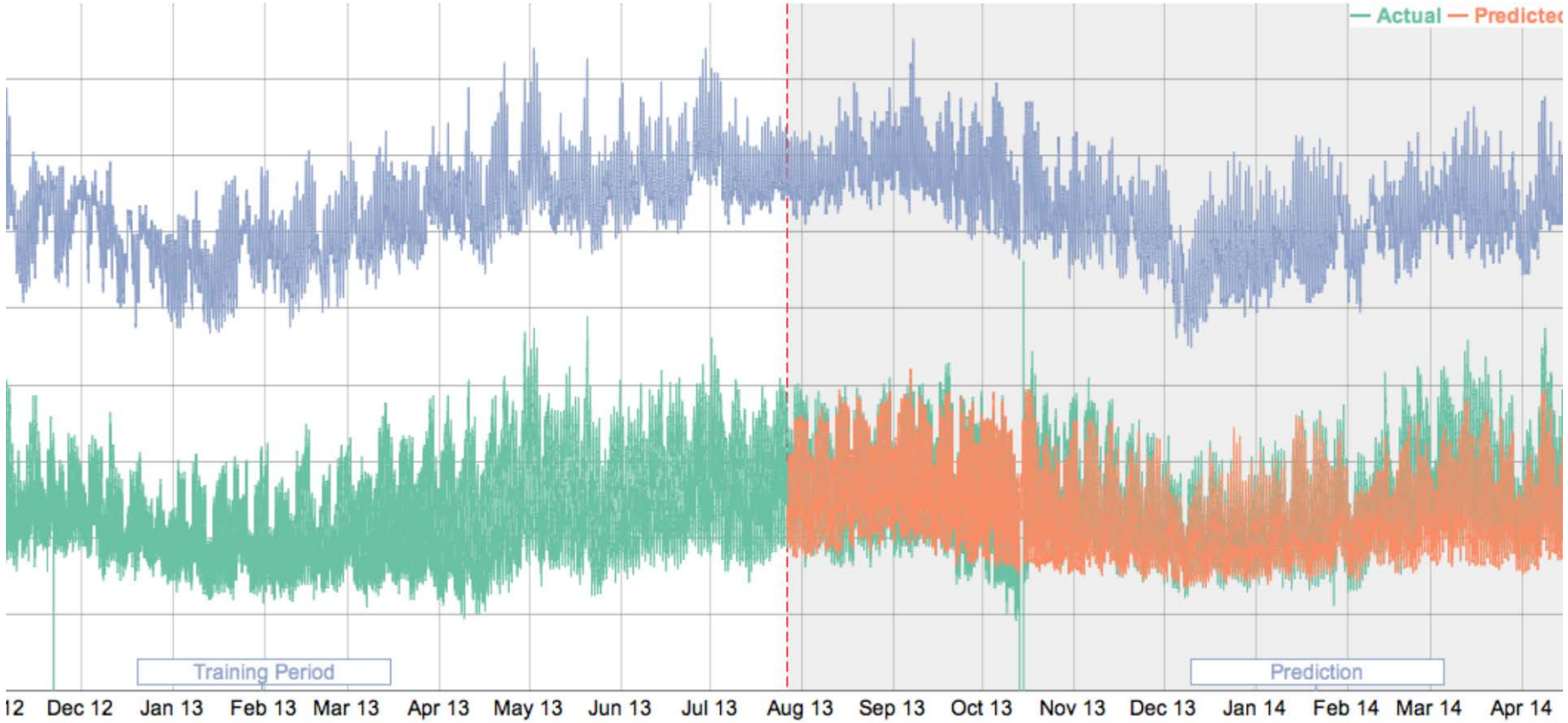
Seattle Pilot

- Practitioner Workflow Document Developed
- Main Sections
  - Prerequisites
  - Establish Baseline
  - Track savings and monitor for non-routine events
  - Document savings claim



Ongoing R&D:
M&V 2.0 Tool Testing

Test Procedure Focuses on Ability to Predict Consumption – Beyond Ability to Fit Baseline Data



LBNL Collaborations on Tool Testing and Guidance

- Now working with Efficiency Valuation Organization (EVO) to transition tool testing for ongoing industry use via automated web infrastructure

- Worked with national Stakeholder Advisory Group to establish guidance for rigor and transparency for 3rd party review