M&V 2.0: Modern Measurement

Residential Case Studies

ENERGYSAVVY

Nomenclature…

> “
>
> Analytic tools and services that provide automated, ongoing analysis of energy consumption data.
>
> NEEP, Regional Evaluation, Measurement & Verification Forum

Floating Names

- M&V 2.0
- Automated M&V
- ICT-Enabled EM&V
- Savings Measurement Software

M&V 2.0 Research

Two leading EE organizations published reports in December 2015

Estimated savings reductions from automated consumption data analysis can provide rapid feedback to programs whether or not this analysis is used as the final evaluated savings. Such rapid feedback is useful whether it is provided as part of program delivery or as part of evaluation.

REGIONAL EVALUATION, MEASUREMENT & VERIFICATION FORUM

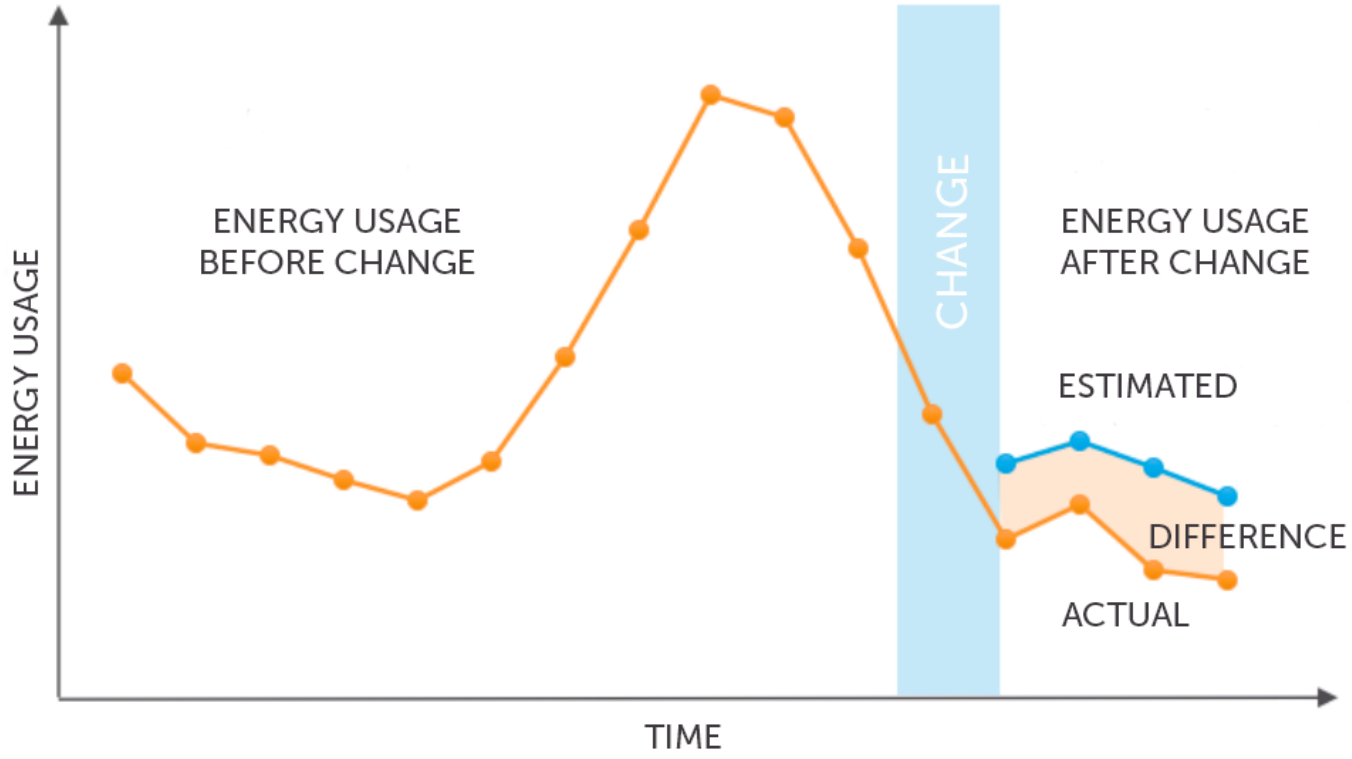
[M&V 2.0] enables them to perform more accurate and timely EM&V at a lower cost. For one thing, remote automated data gathering is likely to be less expensive than traditional onsite inspection. This means that either the overall cost of EM&V can be reduced or higher-quality EM&V can be accomplished within a given budget.

ACEEE
American Council for an Energy-Efficient Economy

States Taking the Lead on M&V 2.0

NY	May 2016: REV Track 2 Order states that earnings adjustments related to net savings are "tied to advances in EM&V that utilize direct customer information."
CA	Oct 2015: Rolling Portfolio Order calls for utilities to plan for "data collection strategies embedded in the program" and "internal performance analysis during deployment." Aug 2016: Rules on EM&V based on "normalized metered energy consumption" finalized by the CPUC
CT	Dec 2015: Department directs $1 million of annual EM&V budget to "direct measurement and verification" via three year Conservation and Load Management plan Aug 2016: State receives DOE SEP grant for EM&V 2.0 pilots starting in 2017.
NM	Aug 2016: Statewide RFP for EM&V services include optional scope for "M&V 2.0" solutions
MO	Late 2016: Writing report on how EM&V 2.0 can support deemed savings updates for statewide TRM

How Does M&V 2.0 Work?



M&V 2.0: FAQ's

AMI or Interval data?

- 2.0 applications are meter agnostic and work with interval, monthly or bi-monthly meter data

10% of savings?

- A billing analysis with an M&V 2.0 approach can estimate savings down to 2-3%

Black box?

- EnergySavvy provides a written methodology to clients, evaluators and regulators. Same as done by traditional evaluators.

Replacing evaluation?

- M&V 2.0 tools enhance and support formal third party evaluation. They are not intended as a replacement.

What can M&V 2.0 do?

Capabilities offered by M&V 2.0 tools

- **Updating deemed savings with local data and analysis**
- **Assessing persistence with continuous measurement**
- **Providing a billing analysis for ex-post M&V for certain programs**
- **Measuring ”net” savings for certain programs***
- **Providing process improvement data to program administrators**
- **Faster feedback for estimating savings from pilots or emerging technologies (e.g. smart thermostats)**
- **Can provide independent analysis to evaluator and program administrator**

*SEEAction Impact Evaluation Guide, Large-scale consumption data analysis approaches. pg 5-4, 5-5

Where doesn't M&V 2.0 fit?

M&V 2.0 is not the best approach for all applications

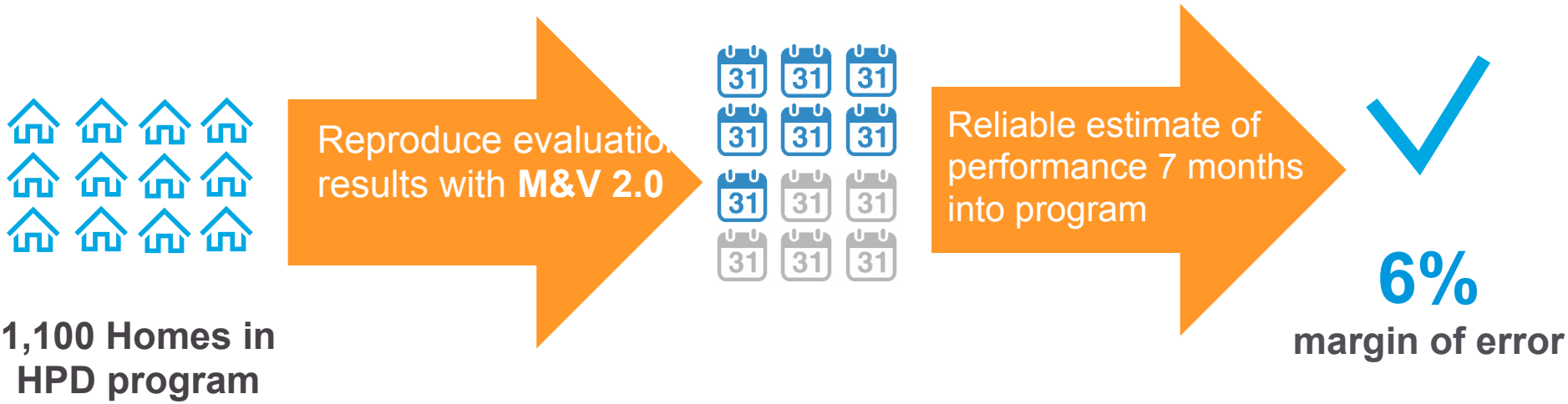
- **Artificial baselines require ex-post engineering adjustments to M&V 2.0 impact analysis**
- **M&V 2.0 cannot assess free ridership or spillover**
- **Not appropriate for certain program types (e.g. industrial projects)**
- **Not designed for market studies or assessing penetration levels for certain technologies**

Basic Case Study

Does it work?
Is it accurate?
How long does it take?

Case Study: PSEG Long Island

Can M&V 2.0 match the existing results in less time w/ bimonthly data?

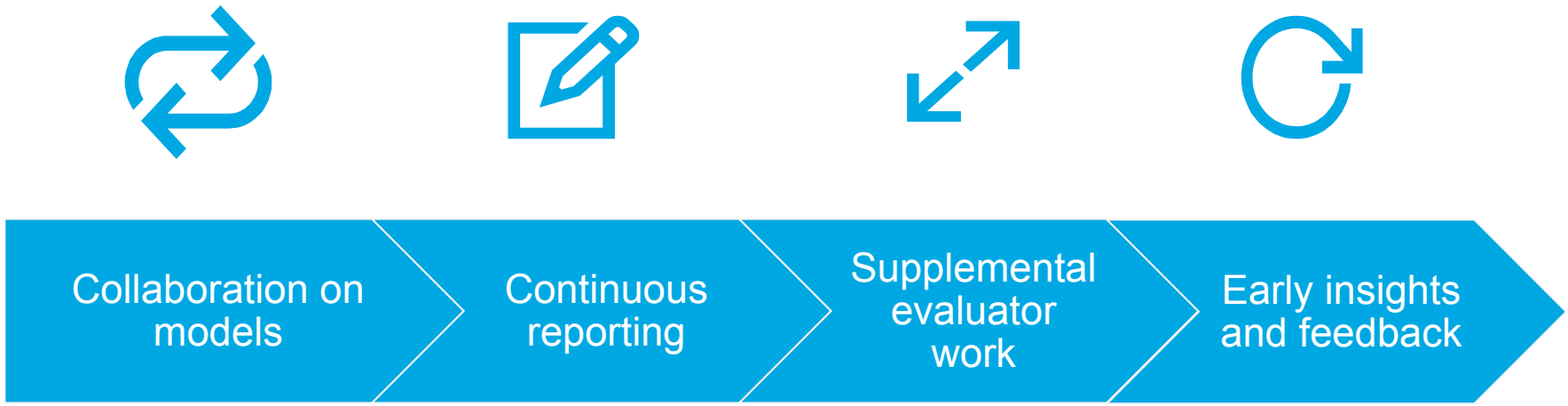


Pending Case Study

Embedding 2.0 into formal evaluation process

Formal EM&V: Illustrative example

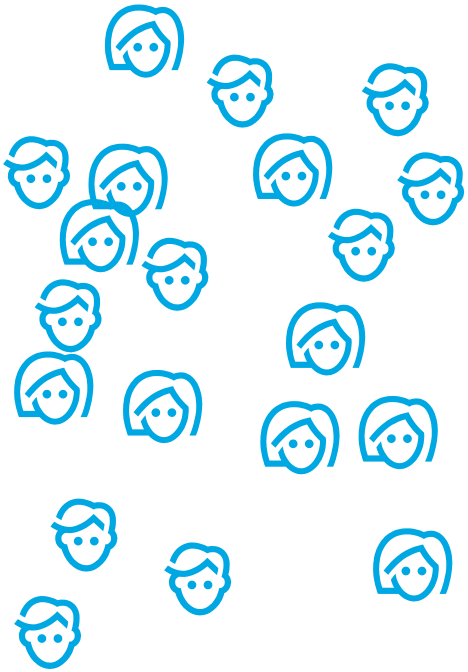
EnergySavvy & EM&V firm jointly evaluating Res HVAC program



Case Study on Faster Feedback

What can be learned from M&V 2.0

Case Study: Arizona Public Service



Challenge
Managing a large network of contractors

Solution
Monitor performance of individual contractors

60+ independent contractors

Continuous monitoring of programs and contractor performance

aps Case Study: Contractor Scorecard

SAVVYUTILITY

Prepared for:
Acme Energy

CONTRACTOR SCORECARD

YOUR SCORES FOR Q1 2016:

	Score	Rank	
Quality of measure installation	2.5 / 3		Top 25%
Scope of work	8.4 / 10		Top 25%
Customer satisfaction	8.4 / 10		Top 50%
Savings achieved	78%		Top 50%
Overall score	9.2 / 10		Top 25%

Your total savings to date: 132,000 kWh

YTD Projects by Location

YTD Projects by Annual Home Usage

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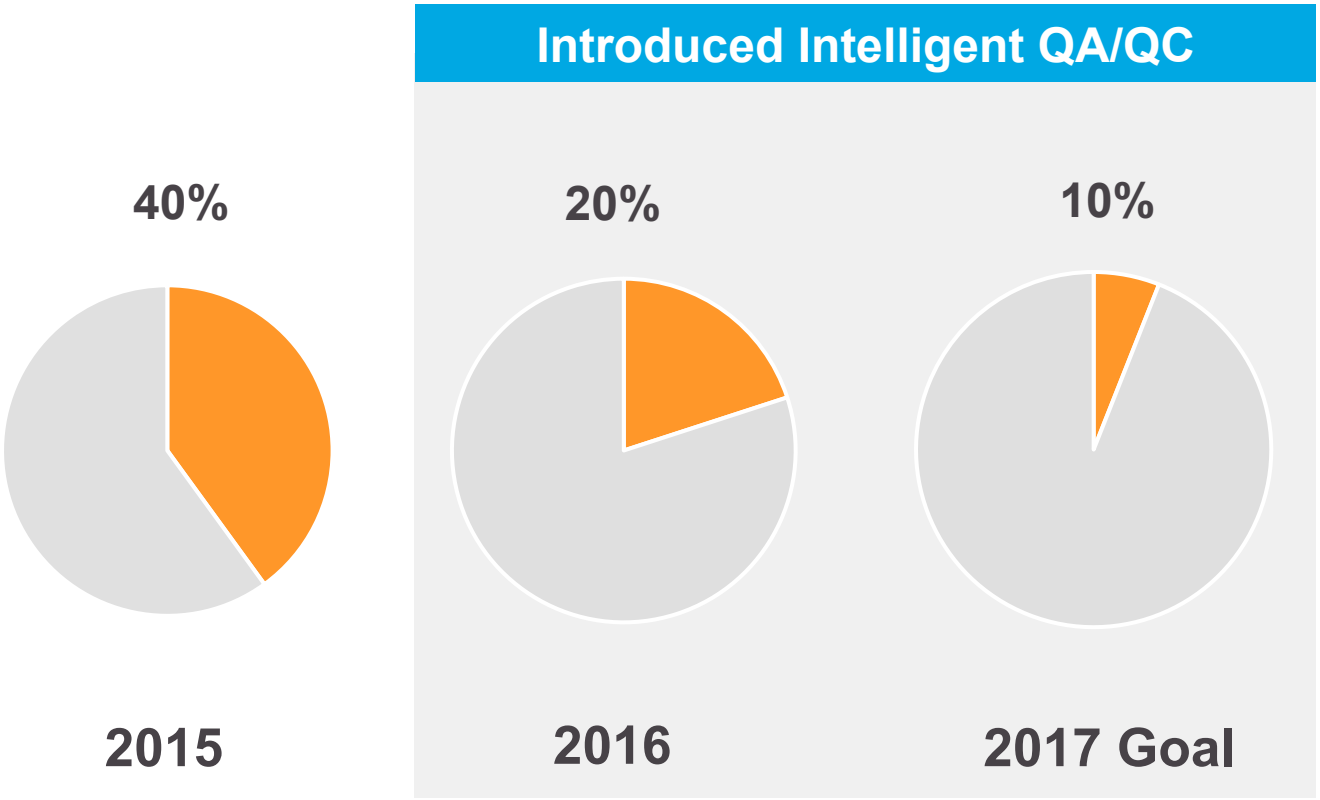
Challenge

Contractors are unaware of their project performance

Solution

Issue scorecards to contractors to communicate performance of projects

Case Study: Attic Inspections



Challenge

Reduce costs and intrusiveness of QA/QC process

Solution

Use intelligent monitoring to reduce and target # of QA/QC inspections

APS shifted approximately 25% of the overall inspection budget to directly improve the program.

**All percentages are the percent of total annual projects (assumes 2,000 projects/year)*

Deep Dive Case Study

Results from Ameren Pilot

Ameren Missouri / EnergySavvy Study Results

From the 2013 Ameren Missouri CoolSavers Program

Directly Analyzed

7,263 homes **22,526 comparison homes**

Measure Findings

- ASHP deemed savings can be higher than a home's typical usage (!)
- Single measure projects seem to be outperforming multiple measure projects

Contractor Findings

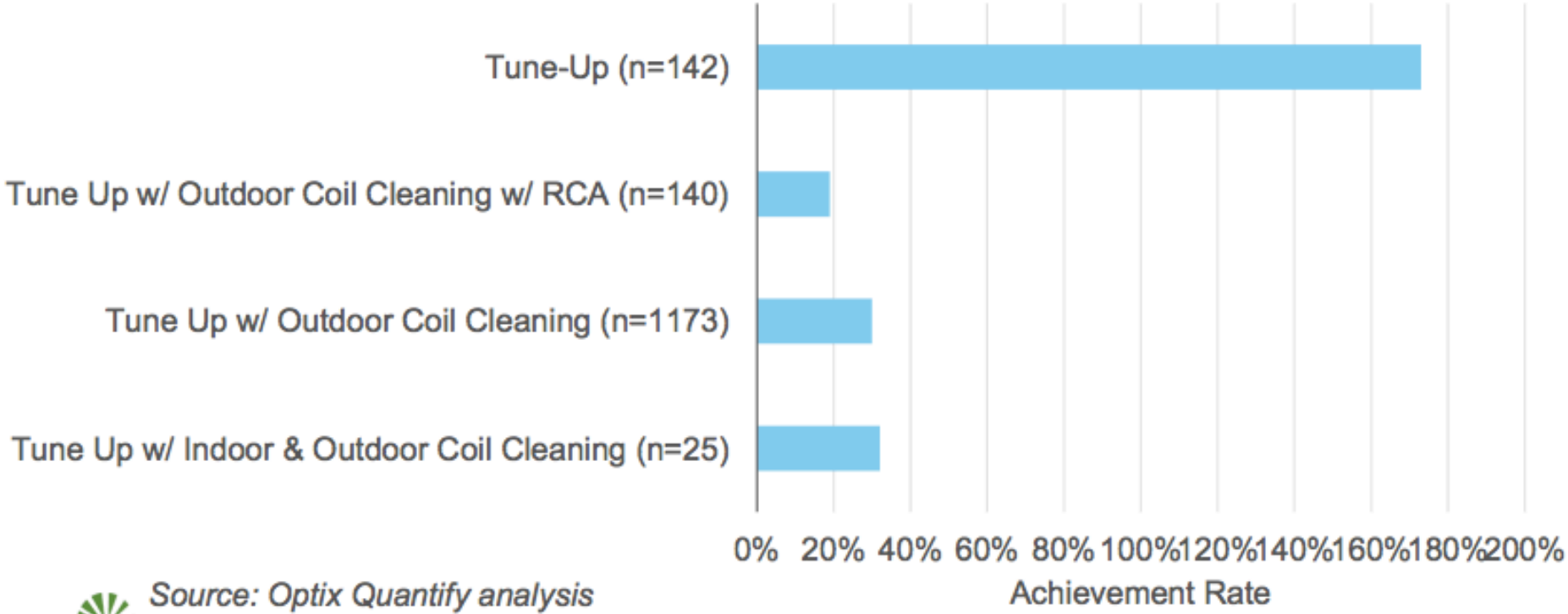
- One contractor's savings performance far exceeds others
- Largest contractor getting very poor savings performance

Timeliness of Insights

- Each of the above insights would have been available mid-way through the PY

Interactive Effects: Tune-Ups

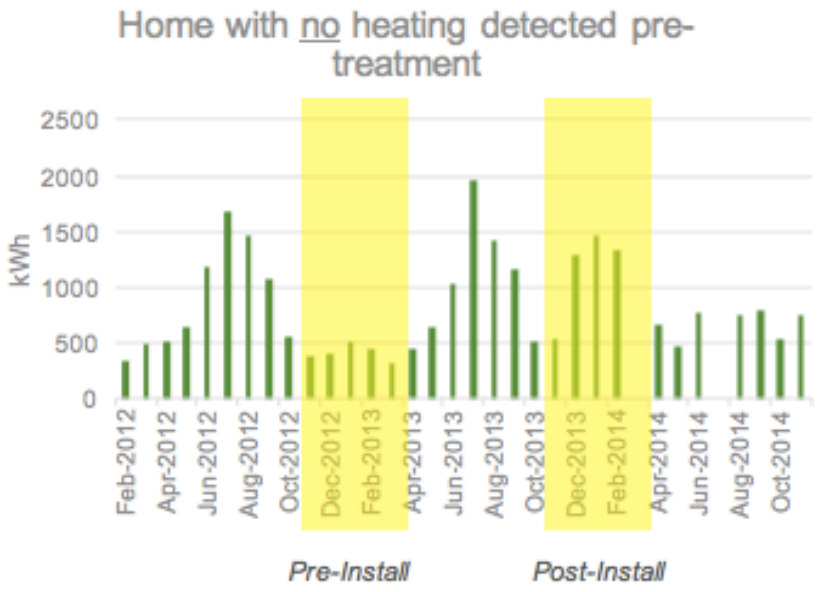
- Tune-ups alone outperformed combination measures
  - All tune-ups saved on average ~270 kWh per home.
  - Low achievement rates for measures where ex ante values are high
    - E.g., Expected savings for Tune-up w/ outdoor (condenser) coil cleaning is 833 kWh/home. Quantify identified 254 kWh/home.

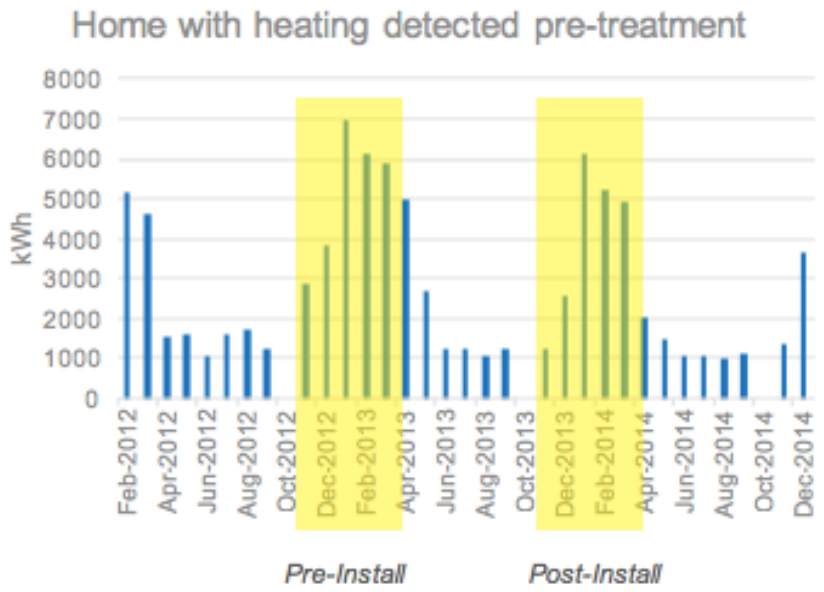


Source: Optix Quantify analysis

ASHP–Electric Furnace Early Replacement

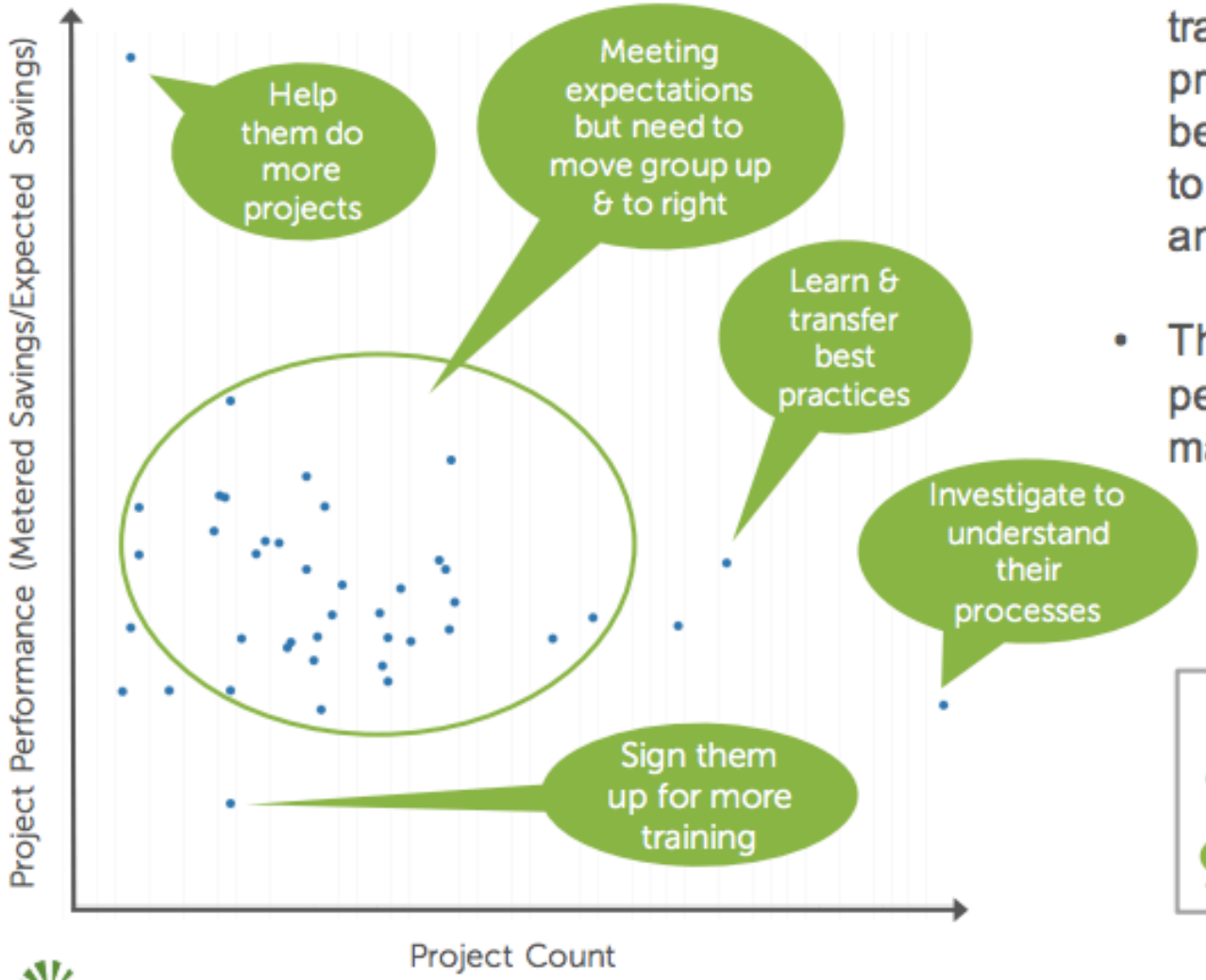
- Usage data shows some homes weren't using much electricity to heat





- The one with electric heating has the highest usage in winter.
- The one without actually increases usage in winter after the ASHP.

Proactive Trade Ally Management



- Quantify identified trade allies whose projects were doing better or worse relative to expected savings and other trade allies
- This enables proactive, performance-based management

Ameren MISSOURI

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Timely Insights

Supporting continuous improvement

If software had been running during the program year, when would each of these key insights have been identified?

- ASHP-EF Early Replacement: August 2013
- CAC SEER 14: August 2013*
- Tune-Ups w/ Coil Cleaning: August 2013
- Contractor performance: July 2013*

**Some combinations took longer*

M&V 2.0 for Residential …and P4P

M&V 2.0 for Residential P4P

Enabling tool to support incentive based energy efficiency

- **Faster estimates of savings support making payments on savings in a timely manner**
- **Ability to subdivide portfolios of projects from which savings are estimated**
- **Transparent M&V 2.0 processes and rigorous tracking systems can help prevent program gaming**

P4P, PG&E and CalTRACK

First modern residential P4P pilot under development

CalTRACK intended to arrive at pre-determined public methodology for estimating savings from homes

Beta testing underway; EnergySavvy part of beta testing

PG&E dashboards will display savings estimates to market participants

Aggregators are compensated at a $/kwh price by PG&E + adder for net savings

M&V 2.0: The Big Takeaway

"Why deem it when you can measure it."

-Tom Eckman's slides at NEEA Efficiency Exchange, 2016

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