HAWAII ENERGY TAG/TWG MEETING

PY16 EM&V Activities

February 28, 2018

Opinion **Dynamics**

Evaluation Team

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Agenda

Present Findings and Implications of EM&V activities completed over the past year, including:

- PY2016 Verification Report
- Comprehensive Longitudinal Effects Study
- Review of Program Operations
- Review of Proposed PY2017 TRM Updates
- Additional Considerations
- Where to find Reports (more information)

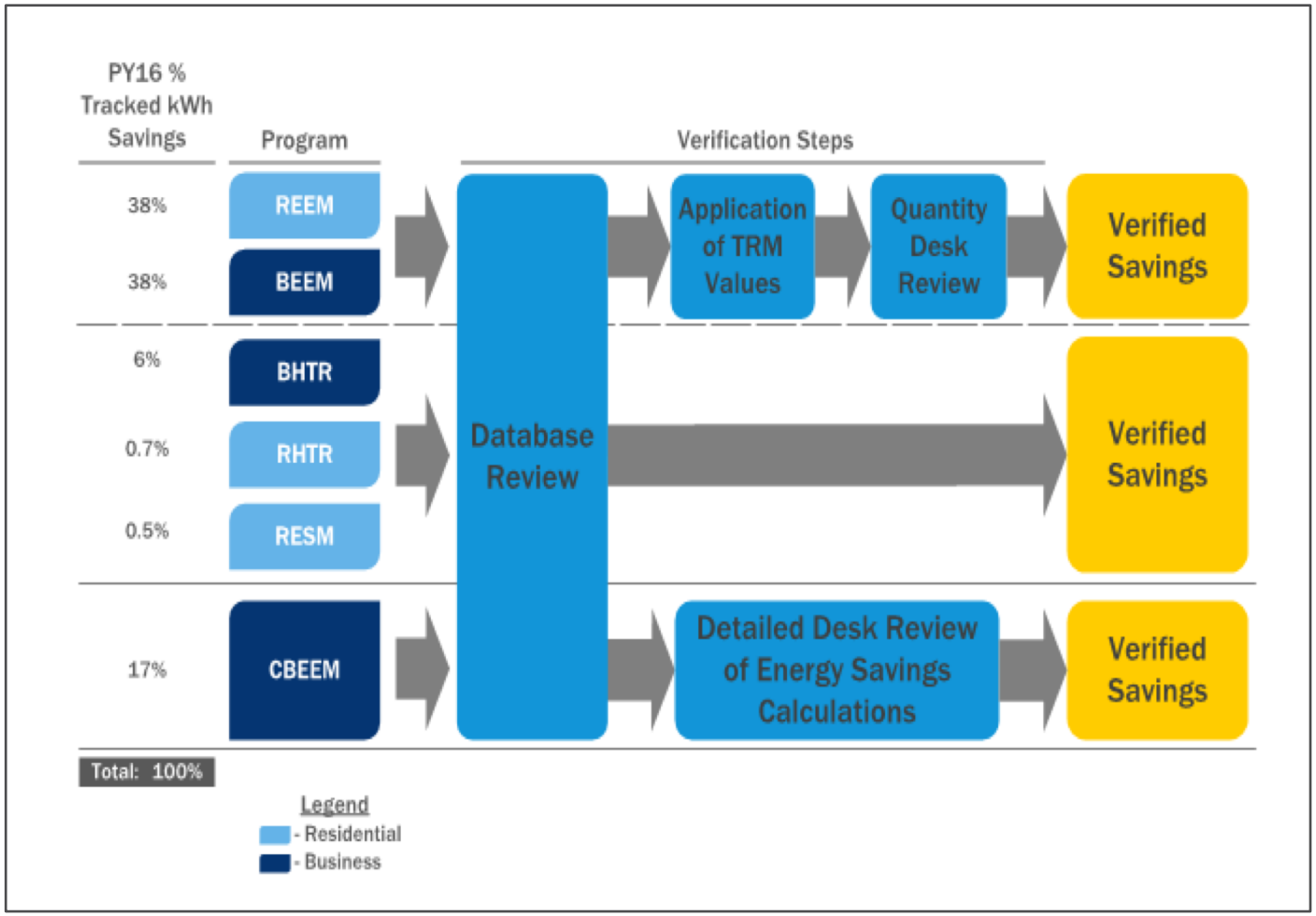
PY2016 Verification Report

Verification Methods:

- Program Database Review
  - Does tracked savings = PBFA claims?
- Application of TRM Values
  - Are key inputs (i.e., per-unit gross savings, NTGR, EULs) following the TRM?
- Quantity Desk Reviews
- Detailed Desk Reviews

- Objectives are to review/adjust:
  - Savings Claims
  - Performance Award Claims
  - Island Equity Claims
  - Total Resource Benefit Claims

Verification Methods



Verification Findings

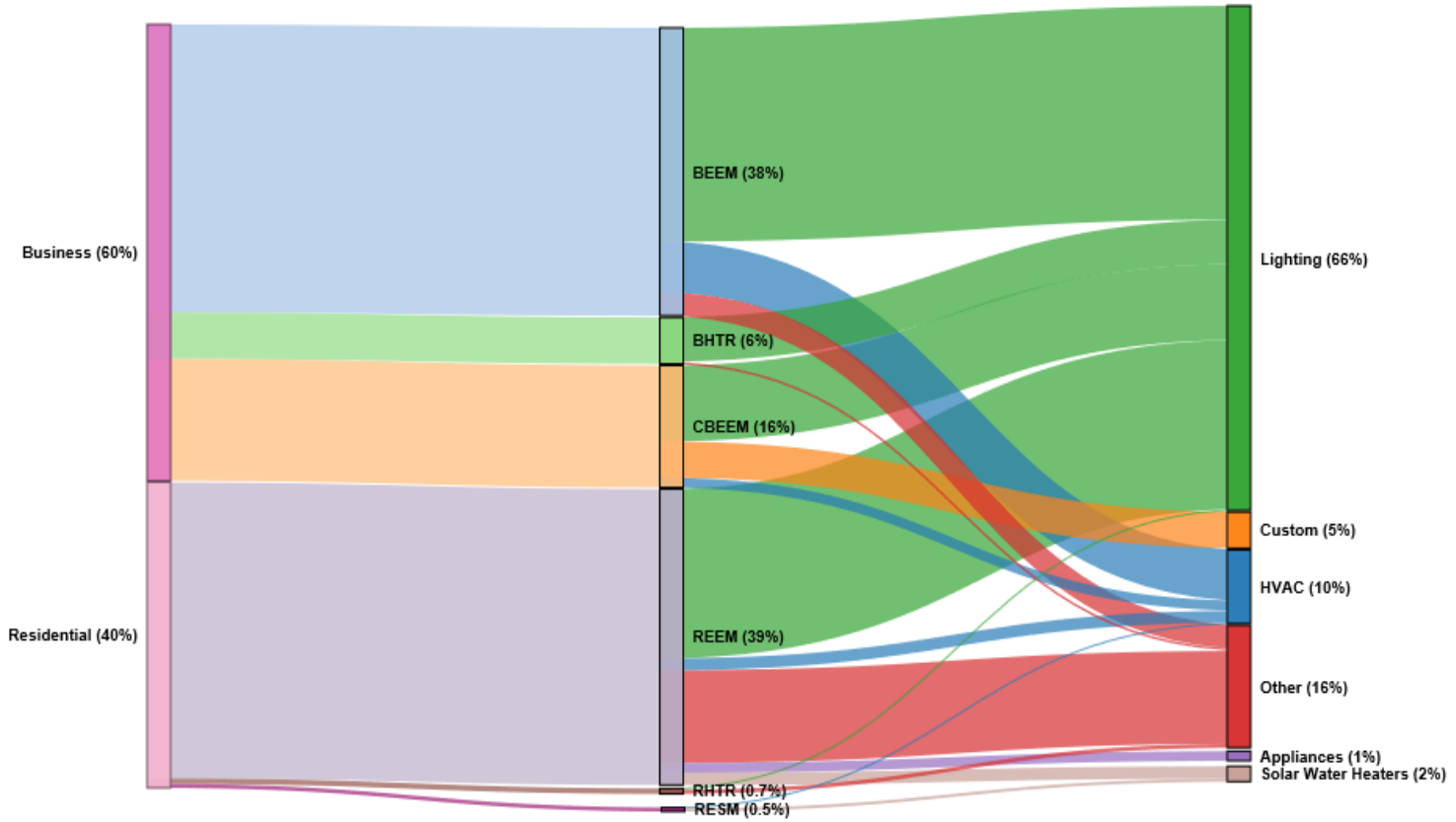
Sector	First-Year Net Savings (MWh)		Verified Savings as % of Tracked Savings	Verified Savings as % of Total Verified Savings	Verified Lifecycle Net Savings (MWh)	Verified Savings as % of Total Verified Lifecycle Net Savings
	Tracked	Verified				
Business	85,272	84,146	98.7%	59.9%	1,149,984	67.4%
Residential	55,544	56,334	101.4%	40.1%	557,456	32.6%
Portfolio	*140,816*	*140,480*	*99.8%*	*100.0%*	*1,707,440*	*100.0%*

- Verification Findings:
  - Overall: Verified savings 99.8% of tracked (claimed) savings
  - Business Programs represent 60% of First-Year Verified Net Savings
  - Business Programs represent 67% of Life-Cycle Verified Net Savings
    - Residential average EUL = 9.9 years
    - Business average EUL = 13.7 years
    - Result: Business programs play bigger role in long-term (Lifecycle) savings

Opinion **Dynamics**

Verification Findings

First-Year Net Verified Savings by Sector, Program, End use



Summary of Verification Findings/Implications

- Overall Verification Rate of 99.8% indicates HE is:
  - Carefully and accurately tracking measure installations
  - Properly applying stipulated TRM values
  - Past 7 verification efforts also had rates ≈ 100%
- Other important metrics met:
  - Island Equity
  - TRB and Performance Award claims
- TRM values received last major update in 2012, suggesting a need to update:
  - Gross savings values for installed measures
  - Net-to-Gross Ratios and baselines
  - System Loss Factors
  - Effective Useful Lives of measures

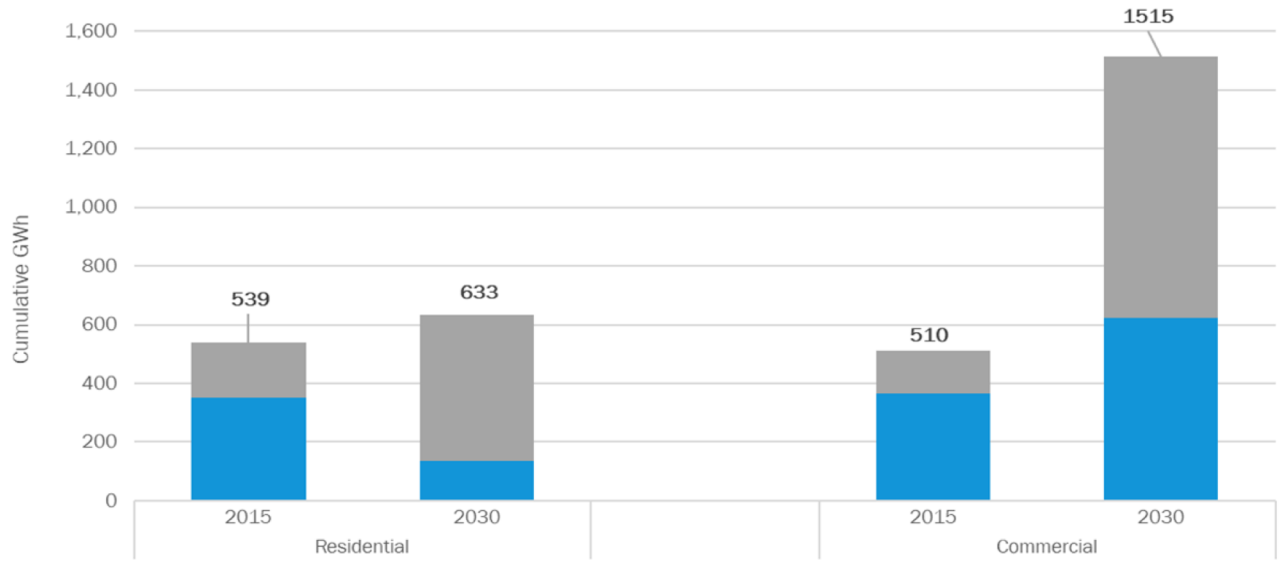
Comprehensive Longitudinal Effect Study

CLE Objectives and Information Sources

- Focused on documenting:
  - Savings claimed by Hawaii Energy to date
  - Potential for programs—based on current designs and savings assumptions—to claim additional savings through 2030
- Sectors: Residential and Business
- Key Information Sources:
  - PY2009-PY2015 Hawaii Energy program databases
  - 2012-13 Baseline and Potential Studies

CLE Findings

Cumulative Available Economic Potential and PBFA Estimates, by Sector (2015 and 2030)



Remaining Available Economic Potential	187	498		143	892
Cumulative PBFA Estimates	352	135		366	623
Total Available Economic Potential	**539**	**633**		**510**	**1,515**
Captured Percentage	**65%**	**21%**		**72%**	**41%**

Cumulative PBFA Estimates Remaining Available Economic Potential

Summary of CLE Findings/Implications

- Cumulative savings (to-date) equally split between the residential (352 GWh) and commercial (366 GWh) sectors
  - A higher proportion of future savings must come from the commercial sector

- Lighting has been dominant source of savings in both sectors
  - Program strategies must adapt to account for a lower proportion of savings from lighting
  - The challenge of replacing lighting savings is particularly acute in the residential sector
  - Savings will likely become more expensive as programs move away from the heavy focus on lighting

Summary of CLE Findings/Implications

- Baseline and Potential Studies nearly 6 years old
  - Important markets (e.g., LEDs) have changed quickly
  - New baseline and potential studies are needed

- PBFA cumulative savings estimates and adjustments need updating (e.g., gross savings, NTGR, SLF, EULs).

Review of Program Operations

Operations Review: Objectives and Information Sources

- Investigate two issues related to program oversight and rebate/incentive payment processes:
  - Safeguards Hawaii Energy has in place to prevent double counting/paying of lighting incentives
  - Practice of allowing trade allies (i.e., contractors) to determine lighting operating hours as part of SBDIL program
- Sector: Business
- Key Information Sources:
  - Program databases and related documentation
  - Multiple meetings and correspondence with Hawaii Energy staff

Summary of Operational Review Findings/Implications

- Safeguards to prevent double counting/payment. We found that:
  - Hawaii Energy consistently performs checks (as part of all application/invoice reviews) to ensure compliance
  - No evidence to suggest double counting/paying is occurring
  - Recommend: Clear set of written procedures and workflows be established

Summary of Operational Review Findings/Implications

- Trade allies entering operation hours for SBDIL. We found that:
  - Projects accounting for approx. 75% of savings/incentive payments receive site inspections
  - All projects with incentive payment of $3,000 or greater receive site inspections
  - Hours entered by trade allies are lower than TRM
  - Implication: No reason to believe trade allies are systematically inflating operating hours

PEER Comparison Program

- Uses a deemed savings (per household) approach
  - Has not been updated since ≈ 2012
- Program expanded significantly since inception
  - Covers almost all Hawaii households
  - Lack of a control group makes evaluation challenging
- Working with Hawaii Energy on new approaches to:
  - Evaluate program
  - Support program design
  - Estimate per household savings

Review of Proposed PY2017 TRM Updates

2017 TRM Review Objectives

- Key Objectives:
  - Assess reasonableness of each proposed update
  - Provide support (as needed) to improve the update
  - Document differences between the PY2015 and PY2016 versions of the TRM

Summary of TRM Review Findings/Implications

- Hawaii Energy proposed 14 unique updates to TRM. In response, EM&V
  - Accepted 6 updates
  - Proposed relatively minor changes to 7 updates
  - Together, these 13 updates pertain to about 5% of overall portfolio savings

- EM&V recommended major changes to 1 proposed TRM update
  - Measure = Residential LEDs
  - Residential LEDs represent about 23% of overall portfolio savings
  - A more complete assessment of the issue is on-going

- Differences found between PY2015 and PY2016 TRM suggest need for guidance document, addressing:
  - Document control procedures
  - Cadence of TRM updates
  - Stakeholders role in updates
  - Timeline and process to be followed for updates

Reporting

Reporting

- History of Annual EM&V-Related Research
  - Covers from inception (PY2009) through PY2016
  - Summarizes all EM&V activities by PY
  - Catalogs--for easy reference--what was done in the past (by broad EM&V categories) and when (what PYs)
  - Available on website

- PY2016 Annual EM&V Report
  - Executive Summary and Full Report
  - Includes Appendices document with all EM&V research/reports discussed today
  - Available on website (soon!)

Additional Considerations

Key Considerations for Future Program Planning and Research

- Underserved Segments remain important source of potential savings and may warrant particular attention in future baseline studies
- Future cost of energy efficiency (on a cost per lifecycle kWh saved basis) will likely go up as least cost, most cost-effective opportunities are addressed
- Framework (guidance) documents are needed for future
  - Establishing baselines and key performance/market metrics
  - Net-to-gross research
  - Measuring/crediting impacts of Market Transformation
  - If/how T&D constraints (e.g., locational, time of day) and DER should be considered when pursuing a 100% renewable goal
  - Criteria/schedules for TRM updates