

# TRACKING SMALL BUSINESS PROGRAM PERFORMANCE WITH ANNUAL BILLING ANALYSES

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# CASE STUDY OF A SMALL BUSINESS PROGRAM EVALUATION

- AEP Ohio's Small Business Express Program
  - Launched in 2011
  - Turnkey, direct install incentive program with single implementation contractor
  - Quasi-prescriptive reported energy savings
  - Lighting (primarily) and refrigeration measures
- Navigant's role
  - Annual impact (gross) and process evaluation
  - Partner with a focus on continuous improvement



Source: AEP Ohio

# PROGRAM EVALUATION OVERVIEW

## HOW DO WE...

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- Verify program impacts?
- Provide meaningful feedback on program performance?
- Improve accuracy of impact estimates?
- Adapt to evolving program measures?



## APPROACH

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- Overarching impact approach
  - Annual billing analysis
  - **Why? Cost-effective, robust, repeatable**
- Additional research tasks
  - Limited onsite verification (~20 each year)
  - Targeted secondary research
  - **Why? Realization rates are not enough on their own to identify drivers**

# BILLING ANALYSIS

- Performed annually; independent analysis each year
- Variation in adoption model takes advantage of variation in the timing of program participation
- Later participants serve as control group, reducing selection bias
- Compared to IPMVP Options A & B...



Source: Sesame Street, Sing the Alphabet, Audio CD, 1996

## Pros

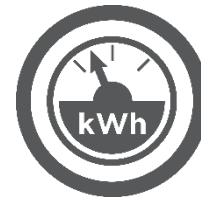
- Captures entire participant population rather than a sample
- Measure agnostic
- Relatively inexpensive
- Continuity for multi-year evaluation

## Cons

- Cannot identify realization rate drivers
- Cannot isolate behavioral or operational changes
- No demand savings estimate with monthly billing data

# BILLING ANALYSIS

- Billing analysis model specifications consistent year to year
- We explored several adjustments to model each year:
  - Binning participants based on either project savings or total facility usage, and running separate models for each bin.
  - Exploring statistically adjusted engineering (SAE) models, which incorporate the *ex ante* claimed savings for each project in the regression.
  - Exploring changes to season definitions.
  - Variables to control correlation between participation date and facility size (e.g., larger facilities reported in Q4 vs. Q1.)
  - Data normalization techniques to model either total kWh or realization rate directly.
  - Requests for additional billing data depending on Q4 p-values.
  - Removal of sites considered to be outliers.
- Overall effect was minor (<5%)



# TARGETED RESEARCH

- Research focused on questioning *ex ante* assumptions
- Engineering-based analysis followed lighting algorithms (below)
- $\{X\}$  below denotes any additional gross energy savings effects, e.g. behavioral changes, operational changes, seasonality → *should these be considered?*

$$\begin{aligned} kWh_{savings} &= (kW_{base} - kW_{eff}) * Qty_{eff} \\ &* Hours * IF_{HVAC} \end{aligned}$$



$$\begin{aligned} kWh_{savings} &= [kW_{base} * (Qty_{base} - Qty_{burnout}) - kW_{eff} * (Qty_{eff})] \\ &* Hours * IF_{HVAC} * \{X\} \end{aligned}$$

# PROVIDING MEANINGFUL PROGRAM IMPROVEMENTS

Capture the impact of lamp burnouts (2012)

Implement more reasonable hours of use estimates specific to each fixture (2013)

Remove HVAC interactive effects in unconditioned or exterior spaces (2014)

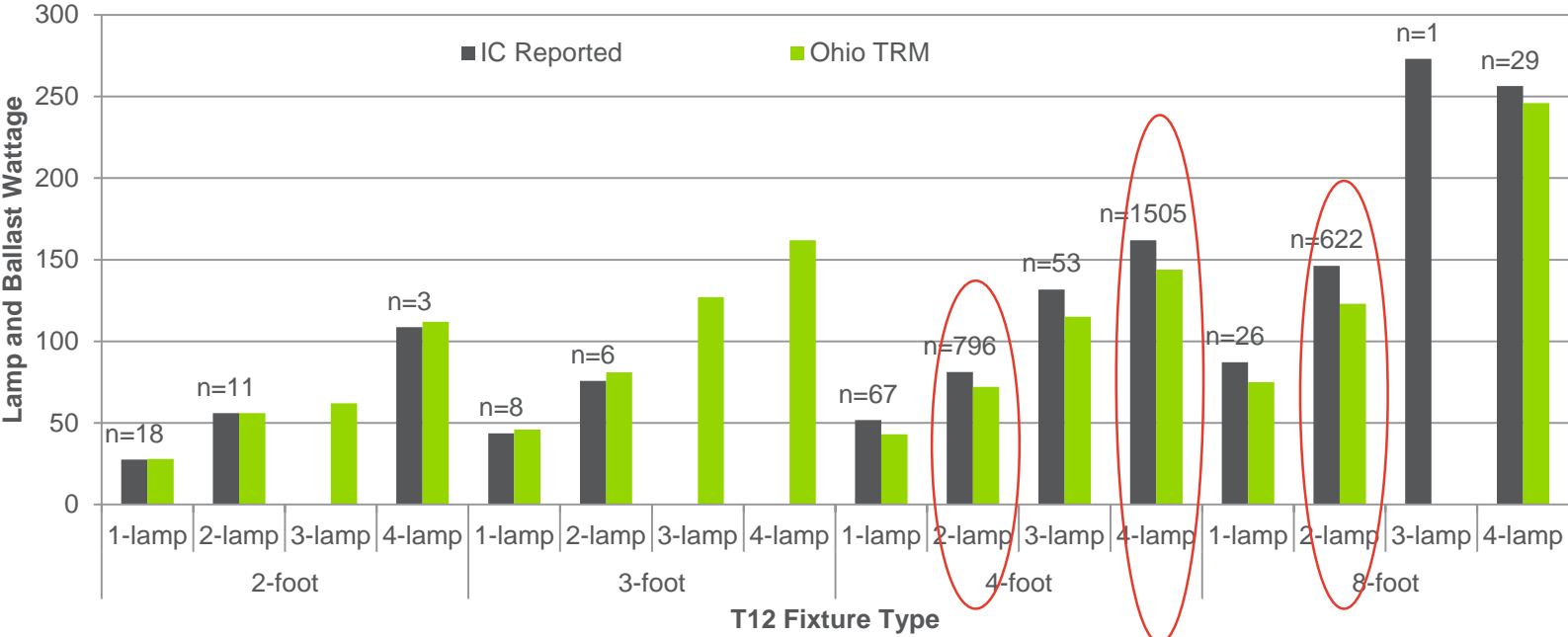
Update baseline and efficient fixture wattages (2015)

Incorporate safeguards when project savings exceed reasonable limits (2015)

Ensure that change orders from installations are captured in tracking databases (2015)

# EXAMPLE: BASELINE WATTS

- Impossible for post-retrofit evaluation to assess directly
- Comparisons with TRM and baseline study estimates indicated potential for overestimation



Source: Navigant Analysis



# REALIZATION RATES PROGRESSIVELY IMPROVED YEAR OVER YEAR

- Targeted improvements led to meaningful increases in the gross energy realization rate



Source: Navigant Analysis

# CONCLUSIONS

- Billing analysis is a cost-effective, robust means of estimating small business program energy savings
- Additional research and engineering judgement necessary to explain realization rate drivers
- Maintaining continuity of approach over several years allows tracking improvements over time
- Evaluation research can focus on individual drivers of interest spread across several years



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