Bundle of M&V Joy?

M&V of Bundled DR Smart Thermostats, Direct Install, and Assessments Programs

IEPEC 2021 – San Diego, CA

ADM

ENERGY RESEARCH AND EVALUATION

Bundle of M&V Joy?

- Introduction
- M&V Approach
- Results & Discussion
- Conclusions

Introduction

2019 Impact Evaluation of Three Bundled Residential Programs:

- Direct Install
- Demand Response Smart Thermostat Annual EE Savings
- In-Home Energy Assessments (IHEA)

Bundling Program Offerings

Pros:

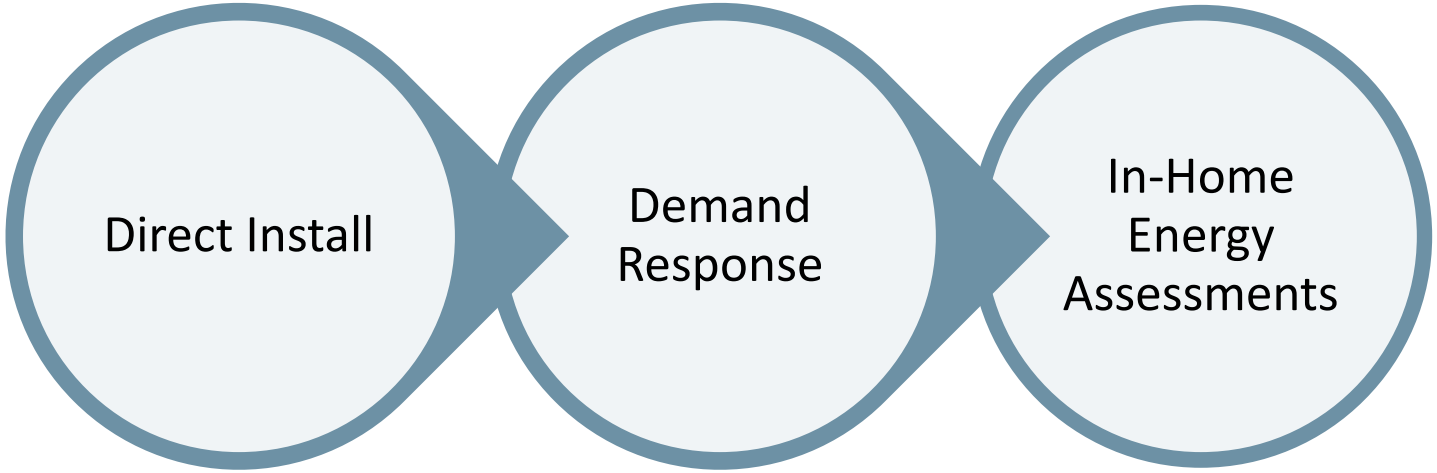
- Single roll of a truck
- Greater program participation
- Increased savings while lowering costs

Cons:

- Attributing savings to the correct programs can be difficult
- Program participants were also cross-participants
  - Typically removed before running a regression analysis

Methods

Choose a Hierarchy of the Programs



- Deemed Savings
- Verified Installations

- Sufficient non-bundled participants for regression model

- Regression model included both DI and DR participants
- Subtracted DI and DR savings

Methods

Direct Install

Measure	Annual Energy Savings (kWh)	Effective Useful Life
Air Filter/Furnace Filter	95	0.5
LED (7W A19)	20	6
LED (8W BR30)	50	14
LED (9W A19)	30	10
LED (9W BR30)	49	20
LED (11W BR30)	47	20
LED (11W A19)	37	8
Photocells	3	8
Refrigerator Thermometer	6	3
Air-conditioner Refrigerant Line Insulation	20	10

M&V Approach:

- Online survey
- Ride-along visits
- Desk review of program tracking data
- Applied the verification rate to the deemed savings

Methods

Demand Response Smart Thermostats

Residential DR Program

- Free smart thermostats for program participants
- Annual EE savings from the smart thermostat optimization evaluated every program year since 2010
- 2019 was the first year of coordinated bundling of smart thermostat installs
- 2019 was the first year for a specific brand of smart thermostat to be the primary device installed

M&V Approach

- Removed all cross-participants (just enough left for 90/10 precision)
- Create a matched control group
- Conduct difference-in-differences regression modeling
- Remove the demand response event savings from the estimated annual savings

Methods

In-Home Energy Assessments

IHEA Program

- Assessments resulted in a written list of improvements such as appliances, lighting, insulation, and behaviors that could be implemented by the customer to save energy
- Assessments were marketed to all utility customers who complained about high electric bills
- Most assessments were bundled with DI or a smart thermostat installation

M&V Approach

- A mixed effects panel regression model using monthly billing data for program participants
- The pre-and-post assessment period energy usage was controlled for changes in weather using HDD and CDD
- All Direct Install and Demand Response smart thermostat participants were included in the regression

Results

Distribution of Bundled Savings

IHEA, Direct Install, and Residential Demand Response	Annual Energy (kWh) Savings per Participant	832
	Count of Participants	6,430
	Total Annual Energy (kWh) Savings	5,349,760
Cross-Participants	DR Program Participant Annual Energy (kWh) Savings	530
	DR Program Participants	1,381
	DR Program Total Annual Energy (kWh) Savings	731,718
	Direct Install Participant Annual Energy (kWh) Savings	250
	Direct Install Participants	4,420
	Direct Install Total Annual Energy (kWh) Savings	1,104,940
IHEA only	Total Annual Energy (kWh) Savings	3,513,102
	Participant Annual Energy (kWh) Savings	547

Conclusions

- Bundled Programs can be evaluated
- A Hierarchal approach, based on certainty of program savings is one possible method
- This evaluation would have been more complicated if a higher percentage of smart thermostats were bundled – which has happened in 2021

Questions?