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Behavioral Energy Feedback Program Evaluations: A Survey of Current Knowledge and a Call to Action

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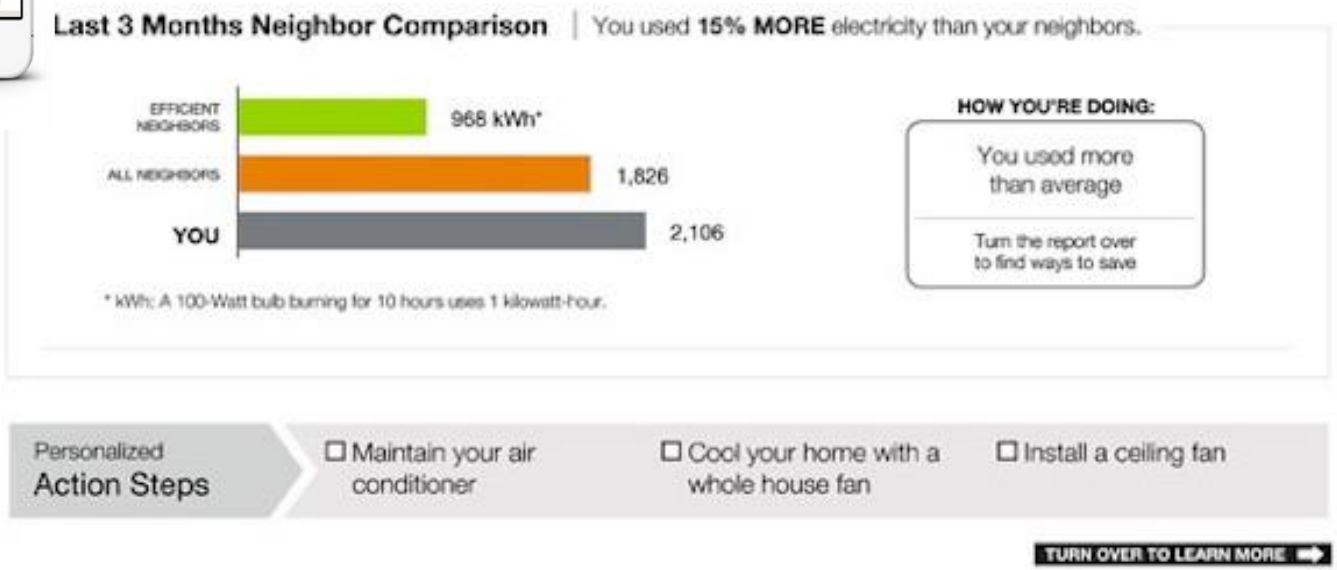
Agenda

- Overview of behavioral energy efficiency programs “behavioral programs”
- Growth of behavioral programs in the United States
- Brief overview of our knowledge to date on behavioral programs
- Recommendations to improve our knowledge to support planning

Defining behavioral programs



Defining behavioral programs

Behavioral programs share a number of common characteristics:

- The use of information to motivate a wide range of behaviors. Unlike traditional rebate programs, behavioral programs do not target a specific piece of equipment or efficiency upgrade. Rather, they attempt to motivate customers to save energy, in general, and the actions taken as a result of these programs can vary dramatically from customer to customer.

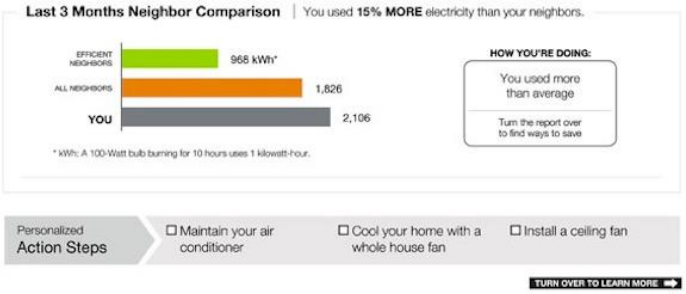
- The use of information, namely energy use feedback at varying levels of detail, to prompt a behavioral response.

- The use of social science theory-based tactics to prompt action, such as benchmarking, social norms, competition, and rewards (not directly linked to the price of efficiency).

- Most programs are designed using an experimental or quasi-experimental approach in order to estimate net savings effects through bill impacts

Behavioral programs are experiencing rapid growth in the US Markets as markets transform and programs struggle to meet goals

- In 2013 across 111 tracked program administrators in 35 states, behavioral programs:
  - Exceeded $54 million in total allocated budget
  - Accounted for 751 GWh of allocated savings in electric portfolios
  - Represented over 1/3 of all planned pilots



Source: ESource DSM Insights

Behavioral program gorowth is driven by a relatively low cost of saved energy for behavioral programs

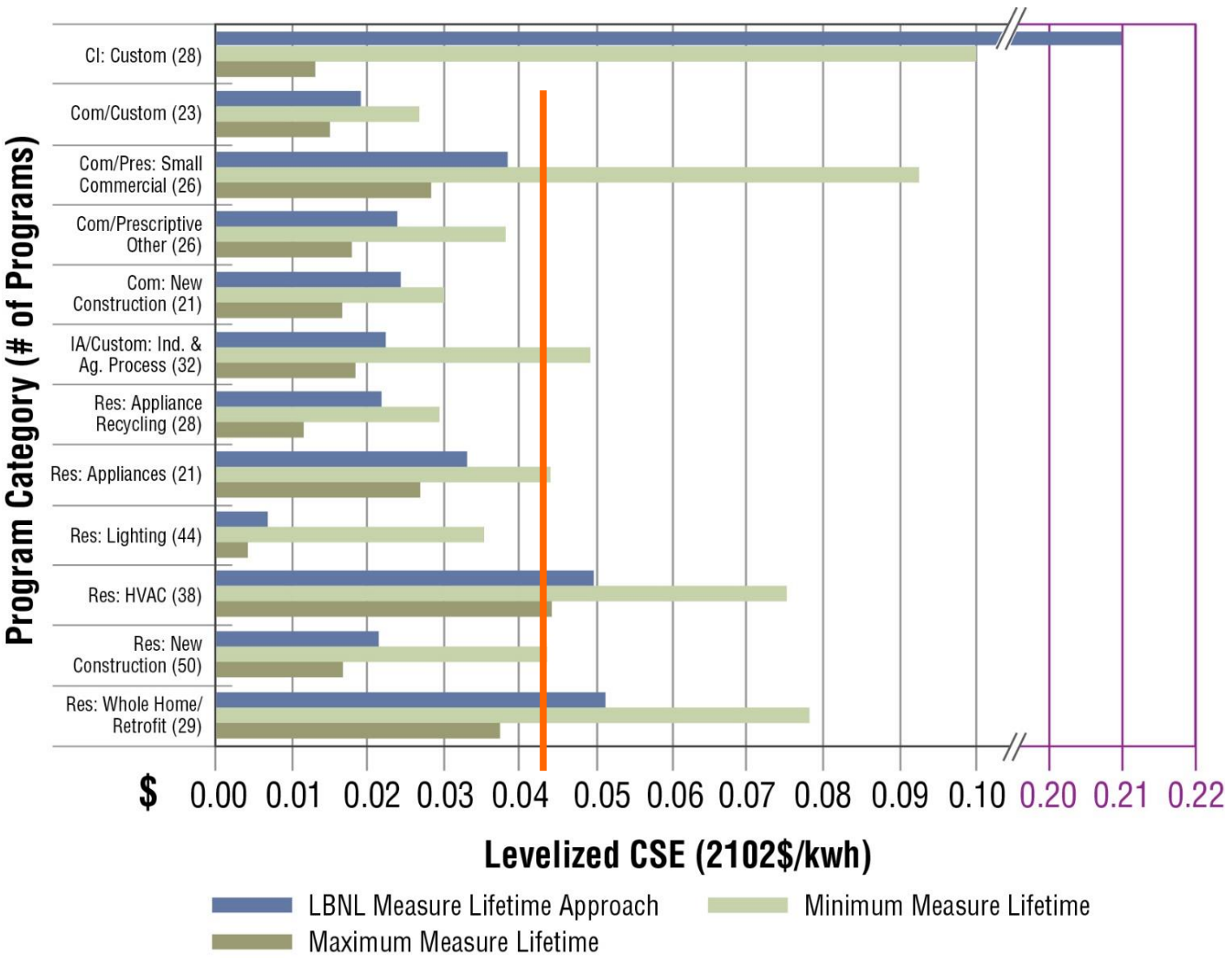
Utility cost of saved energy	**$ per kWh**		**$ per therm**	
	Midwest	West	Midwest	West
Behavior Change/Feedback	$0.04	$0.04	$0.60	$0.66
Building/Home Performance	$0.93	$0.74	$3.77	$5.41
Direct Install	$0.32	$0.29	$0.91	$3.47
Education/Awareness	$0.20	$0.27	$1.05	$5.33
Prescriptive Rebate	$0.10	$0.17	$3.23	$1.29

Based on first-year savings

Based on gross savings and actual results where available. Average across 2009 - 2013

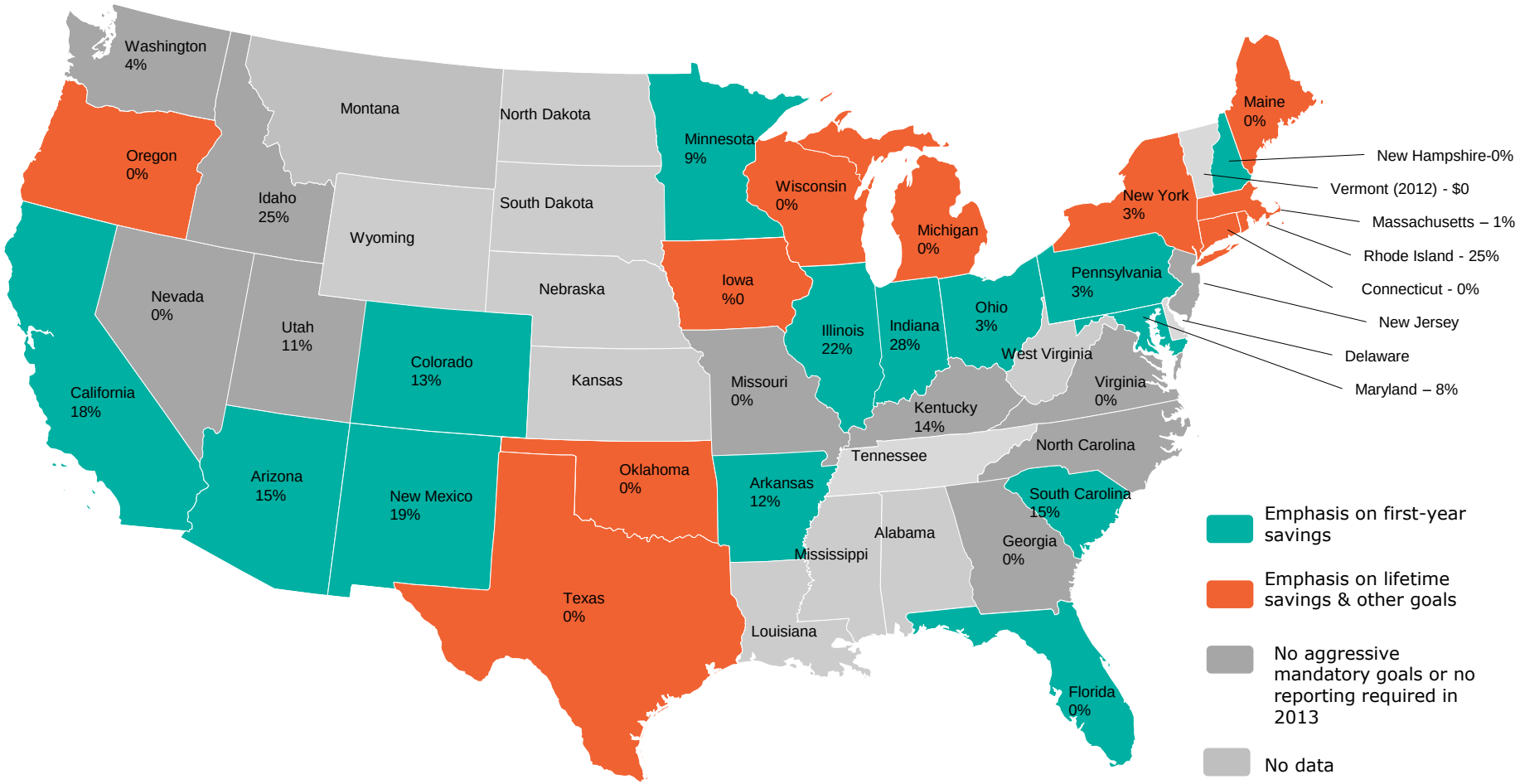
Source: E Source DSM Insights

When factoring in persistence of other programs, behavioral programs do not stand out.



Billingsley, Megan A., Ian M. Hoffman, Elizabeth Stuart, Steven R. Schiller, Charles A. Goldman, and Kristina Hamachi LaCommare. Lawrence Berkeley National Laboratory. The Program Administrator Cost of Saved Energy for Utility Customer-Funded Energy Efficiency Programs. Report. 2014

US States with 1st year goals allocated a greater percent of their portfolio savings goals to behavioral programs in 2013



Should we be investing in behavioral programs at this level? What knowledge do we have to support continuing these programs?

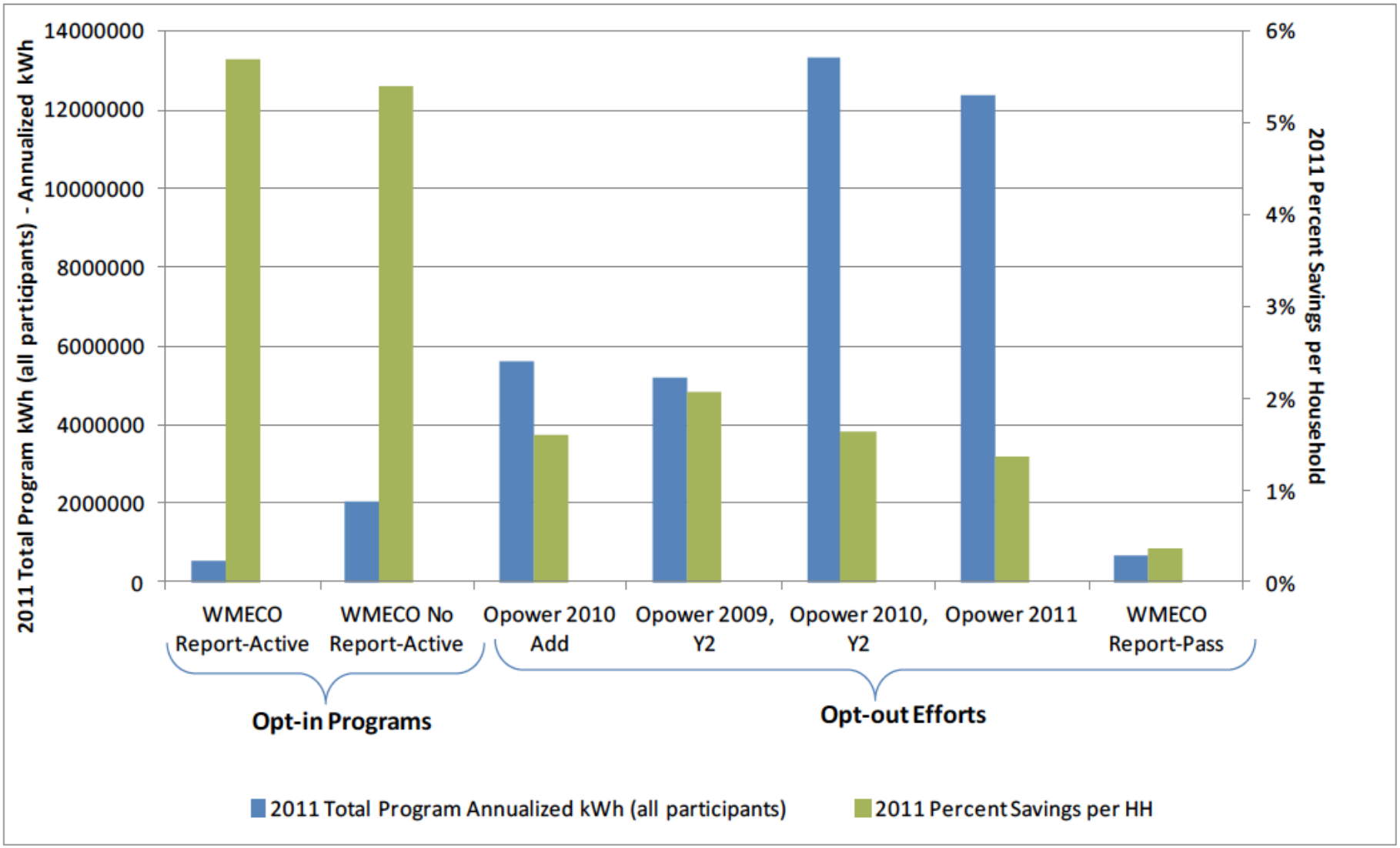
Despite dramatic increases in investment, we know very little about the potential of behavioral programs

- The majority of our knowledge has been derived from a single program type: home energy reports

- Nearly all knowledge has been gained through evaluation with very little emphasis on experimentation and formative research to support policy, design, and planning

Key Planning Questions	HER Opt-Out	Online Feedback Opt-in	Amount of Information Legend
How do savings vary by program type (opt-in vs. opt-out)?	✔ due to the absence of systematic comparative analysis between models in the energy context		✔✔✔✔ = Substantial information ✔✔✔ = Moderate information ✔✔ = Some information ✔ = Limited information
How are savings generated and from which end use?	✔✔✔	✔✔	
How long will savings persist?	✔✔	✔	
How do savings vary by participant type?	✔	✔	

How do savings vary by program type?



Opinion Dynamics and Navigant Consulting. 2012. MASSACHUSETTS THREE YEAR CROSS-CUTTING BEHAVIORAL PROGRAM EVALUATION INTEGRATED REPORT

Do savings persist (with treatment)?

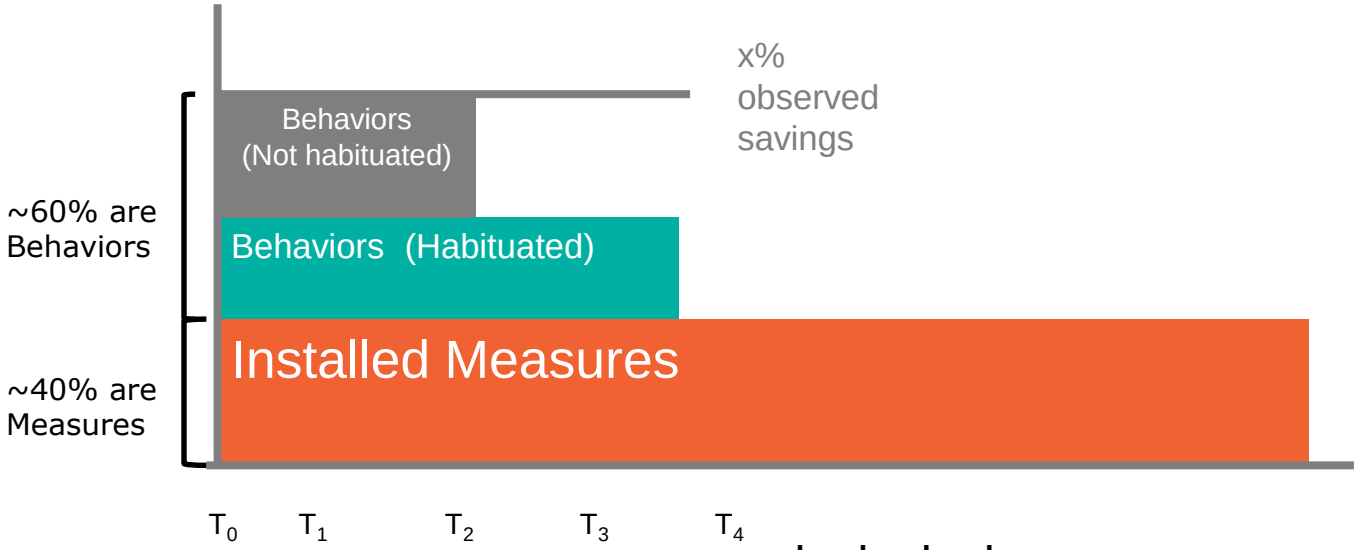
Key studies in behavior program persistence with treatment

Program Example (PA and Cohort Year)	Program Year Savings (Percent per HH) 1	2	3	4	5
Paper Opt-out					
SMUD HER (2008)	1.8%	2.4%	2.4%	2.1%	
National Grid HER (2009)	1.6%	2.1%	2.2%		
Online Opt-in					
ComEd C3 Program	4.4%	3.8%			
Lake Region MyMeter	2.6%	2.6%	2.6%		
Wright Hennepin MyMeter	2.2%	2.2%	2.2%	2.2%	2.2%

Source: See reference section

How do savings vary by end use (and will they persist without treatment)?

Illustration of behavior program savings sources and potential persistence – oversimplification



How do savings vary by type of participant?

- Few studies examine the differences in savings by type of participant, namely because
  - The vast majority of programs target high-usage participant
  - When attempting to account for savings using explanatory variables, usage emerges as the most meaningful
- Other variables that are often correlated with usage have proven to be insightful, such age of home, older home owners

What is needed to successfully augment our knowledge of behavioral programs?

Recommendation 1.

Continue to invest in, and increase investment in, planning-focused research on behavioral program efforts including:

- Continue to invest in on-going persistence analyses and studies focused on establishing a more accurate estimate of lifetime savings.
- Existing studies are conducted jurisdiction-by-jurisdiction and program-by-program. To more adequately answer this question, a cross-program meta study should be considered in order to develop a measure life that can be reasonably applied to this class of programs.

Recommendation 2.

- Carefully examine the source of behavioral program savings through longitudinal smart meter data analyses at the premise level utilizing appliance-level disaggregation analyses.
- Such technologies are capable of identifying major end uses to help identify the source of savings

What is needed to successfully augment our knowledge of behavioral programs?

Recommendation 3.

Foster policy environments that promote field experimentation. Such experiments should be used to determine how to garner the greatest savings from behavioral efforts across the population and within the portfolio. Specifically, these experiments should focus on examining:

- Savings potential from different intervention strategies
- Savings potential among moderate and low usage household

Recommendation 4.

Conduct portfolio savings forecast simulations to examine the potential of of behavioral programs efforts to garner long-term savings under varying savings assumptions, including:

- low, medium, and high levels of measure installations as a result of CBPs and resulting persistence outcomes
- varying levels of portfolio investment in behavioral program efforts.

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