Avoiding the Double-Counting of Savings in Michigan's Behavioral EWR Programs: Current Practice & Future Options

Behavior Measure Presentation—MPSC Energy Waste Reduction Collaborative

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Behavior Presentation—Avoiding Double-Counting of Savings Agenda

1. Review Objectives of Behavior Presentations
2. Behavior Programs and Joint Savings
3. Measuring Joint Savings and Avoiding Double-Counting
4. Existing Methods and Recommendations for Michigan

Behavior Measure Series presentations to the Collaborative are intended to provide actionable information on key behavior-related topics and concerns, review best practices and methods, and suggest approaches appropriate to Michigan.

- Avoiding Double-Counting presentation objectives:
  - Explain how behavior programs interact with other EE programs to jointly produce energy savings
  - Provide an overview of how joint savings are typically counted in behavior and other program evaluations
  - Summarize best practices and approaches used in other jurisdictions for measuring joint savings and accounting for them to avoid double-counting
  - Review MPSC requirements and Michigan IOU practices related to joint savings
  - Provide recommendations for dealing with double-counting of behavioral savings in Michigan

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2	**Behavior Programs and Joint Savings**
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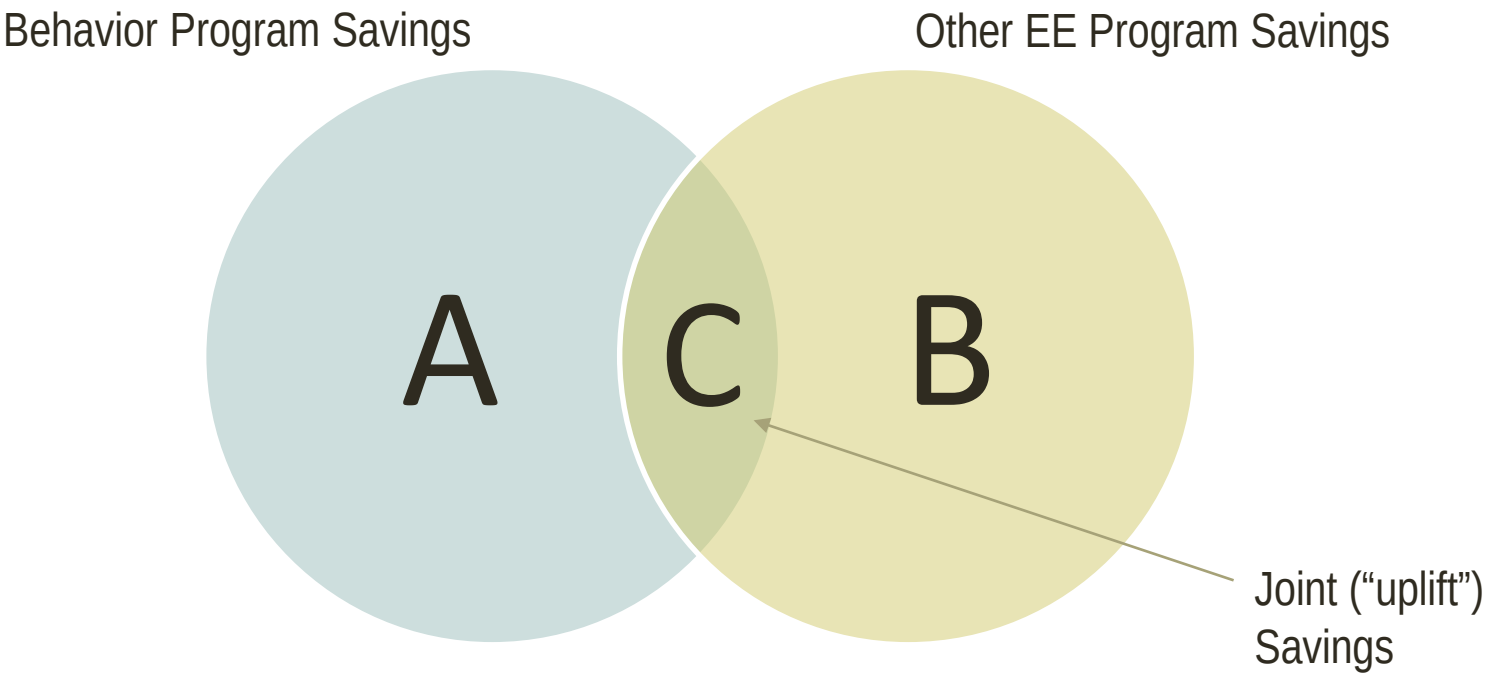
Behavior programs can lead to joint savings through several different causal channels.

- Joint savings causal mechanisms
  - Behavior programs use behavior-based "nudges" to encourage energy savings *both* through behavior changes and home improvements
  - Customers may see how their energy use compares with others and decide on their own to make efficiency upgrades, which may include installing LEDs
  - Other customers may react to personalized tips and program cross-promotion, particularly of LEDs, embedded directly in the HER reports themselves

Double-Counting of savings can occur if a behavioral program encourages participation in other energy efficiency programs, and the resulting savings is claimed by both programs.



If Double-Counting is not properly accounted for:

True Total Savings = A + B + C

Total Measured Savings = A + B + 2C

Double-Counted Savings = C

Joint savings for behavioral programs are *typically small*, accounting for less than 1% of program electric savings, *and can be positive or negative* depending on the program.

- Michigan Behavior Resource Manual (BRM)
  - Defines calibrated "double counting adjustment factors"* for electric and gas, respectively as 0.17% and 5.04%
  - These values are small adjustments relative to overall program savings

APPENDIX B. HOME ENERGY REPORT: DOUBLE COUNTING RESULTS

For Wave 1 Dual Fuel customers, the Home Energy Report caused the largest statistically significant participation change in the Audit and Weatherization Program.

FIGURE B-1. HOME ENERGY REPORT

PY2017 Wave 1 Dual Fuel Customer Channeling - Electric

	ARP	A&W	EEA	HEC	HES	HVAC	INSIGHT
Average program savings (annual kWh per participant)	1,147	233	654	573	311	688	122
Number of treatment customers	109,140	109,140	109,140	109,140	109,140	109,140	109,140
Treatment rate of participation, PY2017	1.19%	0.35%	0.32%	1.37%	1.01%	0.94%	7.34%
Change in rate of treatment participation from pre-program year	-0.15%	0.11%	0.06%		-0.38%	0.29%	
Number of control customer	32,100	32,100	32,100	32,100	32,100	32,100	32,100
Control rate of participation, PY2017	1%	0%	0%	1%	1%	1%	7%
Change in rate of control participation from pre-program year	-0.24%	0.02%	0.02%		-0.34%	0.41%	
DID or POD statistic	-0.08%	0.11%	0.05%	0.98%	-0.28%	0.17%	5.42%
Participant uplift	-86	116	56	1,073	-308	189	5,913
Statistically significant at the 90% confidence level?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Savings attributable to other programs (kWh)	-98,639	27,074	36,632	615,315	-95,789	130,094	719,870
Percentage change in EE program participation rate for HER participants	8.22%	35.58%	14.19%	4.37%	-4.22%	-11.11%	12.50%

Source: Navigant analysis of Oracle supplied DTE billing and tracking data and other DTE residential program tracking data

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HOME ENERGY REPORT

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HER uplift by program for a sample wave

** These double-counting adjustment factors in the HER Calibration reported cited in the BRM are based on programs with participant tracking data available, and hence do not include/reflect potential upstream program double-counted savings. Primary research has not been completed to quantify upstream lighting or other upstream program double-counted savings in Michigan.*

Upstream double-counted savings are typically small, hard to quantify, and short-lived (as lighting programs wane), and as such are not accounted for at all by many states and jurisdictions.

- In the survey of primary research conducted for this presentation, the largest value recorded was 2.6% (PG&E 2012)
- **Most primary research-based values are not statistically significantly different from zero, or are actually *negative***
- **As a result, most jurisdictions *do not make any adjustment for possible upstream double-counting of behavioral savings***
- For those that do, the highest value is the *deemed value* of 3% used in Pennsylvania for long duration HER waves

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The evaluator's ability to measure joint savings depends on program design. Upstream and downstream EE programs require different approaches.

- Upstream vs. downstream EE program uplift
  - Downstream programs
    - Possible to track purchases of rebated measures
    - Program tracking data can be used to quantify and adjust for potential double-counted savings
    - Thermostats are a good example
    - "Channeling" analysis often used to measure the increase in other EE program participation caused by HER; results are subtracted from HER savings to avoid double-counting
  - Upstream programs
    - Usually not possible to track customer purchases
    - Customers do not apply for and receive rebates—hence tracking data does not exist
    - LEDs in the Energy Star program are a good example
    - Retailer data purchases, customer surveys, home visits or adjustment factors may be used to address double-counting

For most downstream programs double-counting is easily dealt with "channeling" analysis,.

- Industry best practices
  - Compare participation for HER treatment and control customers across all downstream EE programs before and during program treatment
    1. Calculate average savings per program participant across the other EE programs
    2. Calculate "uplift" or the increase in participation in an EE program due to HER treatment using a Difference in Differences (DID) statistic or regression analysis
    3. Adjust for additional considerations as appropriate
       1. Measure installation date for weather sensitive measures
       2. Customer account closures
       3. Existing HER treatment and control group participation differences in EE programs prior to treatment
       4. Multi-year measure life of previously installed measures in the case of behavioral programs with multi-year measure lives
    4. Use the uplift and average per-participant savings to calculate HER double-counted savings for each downstream EE program, and subtract them from total HER program savings
  - Conduct symmetric analysis but use the results to establish deemed per-participant HER double-counting savings to be subtracted from total HER program savings

Upstream programs pose a special challenge to measuring and accounting for behavior program double-counted savings because tracking data does not exist.

- In the absence of program participation tracking data, evaluators may collect data on the installation of program LEDs by HER treatment and control customers to calculate uplift
  - Online or telephone surveys
  - In-store intercept surveys
  - Customer home visits (on-site inspections/audits)

Upstream programs pose a special challenge to measuring and accounting for behavior program double-counted savings because tracking data does not exist.

- Alternatively, evaluators may establish default or deemed adjustment values to subtract from behavioral program savings

Approach	Advantages	Disadvantages
Customer Surveys	• May be cost-effective	• Customer responses subject to errors and/or bias • May require completing large number of surveys to detect program lift
Home Visits	• Avoids some reporting bias and/or recall errors • Provides most accurate estimate of installed and stored LEDs	• Unlikely to be cost-effective given the large number of home visits required
Default Adjustment Values	• Most cost-effective	• Values may lack empirical basis • Values may not be jurisdiction-specific

Customer surveys are the most common method for quantifying upstream double-counting of behavioral program savings; they can be cost-effective, and yield jurisdiction-specific findings.

- Survey-based study examples
  - Pacific Power*
    - Live phone audit of LEDs installed in home
    - Found zero statistically significant difference; zero double-counted savings
  - Efficiency Vermont**
    - Large scale telephone survey of purchases
    - Found zero statistically significant difference; zero double-counted savings
  - Puget Sound Electric***
    - Large-scale survey of purchases
    - Estimated *statistically insignificant* per-person annual double-counted savings of 1.6 kWh

** "Washington Home Energy Reporting Program: 18-month Evaluation Report". June 18, 2014. Prepared by Navigant Consulting, Inc., for Pacific Power.*
*** "2015 HER Behavior Pilot Evaluation Report." September 7, 2016. Prepared for the Vermont Public Service Department by The Cadmus Group, Inc.*
**** "Puget Sound Energy's Home Energy Reports: 2012 Impact Evaluation." March 2013. Prepared by KEMA, Inc.*

In-home audits of behavior program treatment and control customers is a robust approach, but costly due to large sample sizes needed due to small differences between groups.

- Home visit-based studies
  - PG&E
    - Home inventory approach
    - Estimated double-counting equal to 2.6% of HER total program savings*
  - These studies are infrequent, because they are very costly—hence few examples are available

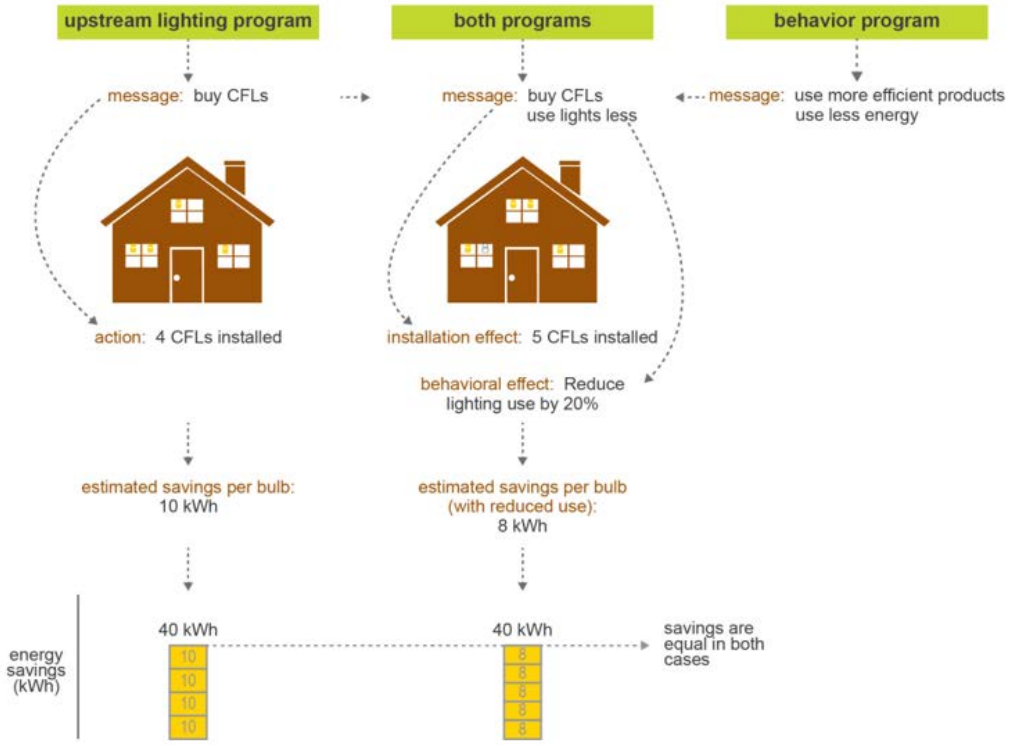
** "Neighbor Comparison Reports Produce Savings, but HOW?" ACEEE Summer Study on Energy Efficiency in Buildings, conference proceedings paper, prepared by Brian Smith & Lucy Morris of PG&E, 2014.*

Research shows customers are often unaware the bulbs they purchase are incented through a program; hence survey and in-home audit approaches are subject to this bias.

- Upstream incentive awareness issues
  - Customers are often not aware they are purchasing program-incented bulbs
  - As a result, surveys and home audits are both prone to uncertainty regarding the proportion of purchased or installed bulbs that are actually program-incented
  - Most surveys do not ask respondents whether bulbs were incented, due to the expectation that customers will not be able to answer this question accurately

Another consideration is the "behavioral factor"—HER treatment may increase purchases of efficient lighting, but *participants may also reduce their use of lighting due to treatment.*

- Considering the "behavioral factor"
  - HER treatment may increase purchases of efficient lighting through upstream programs
  - But, HER treatment may decrease customers' usage of their lighting (the "behavioral effect")
  - *These customers buy more LEDs, but turn them on less*—hence subtracting off the full amount of double-counted savings may over-penalize the HER program



Source: Navigant (Hampton & Provencher, 2015)

Some jurisdictions choose to establish deemed or default adjustment factors to scale-down behavioral program savings to account for upstream double-counting,.

- Pennsylvania has chosen statewide to establish set adjustment factors to account for potential upstream lighting savings double-counting*
  - Adjustment factors vary with the duration of HER treatment

Table 29: Default Upstream Adjustment Factors[103]

Years Since Cohort Inception	Default Upstream Reduction Factor
1	0.75%
2	1.5%
3	2.25%
4 and beyond	3.0%

- As shown in the table above, these adjustments range from less than 1% the first year, up to 3% of HER program savings after 4 years of treatment
- These adjustments are more aggressive than supported by most primary research
- Approach is cost-effective and justifiable given the large uncertainties in primary research-based approaches

** The table above showing Pennsylvania's deemed HER upstream adjustment factors is excerpted from the Evaluation Framework for Pennsylvania Act 129 Phase III Energy Efficiency and Conservation Programs, 2018, Section 6.1.1.8 , available at: http://www.puc.pa.gov/Electric/pdf/Act129/SWE_PhaseIII-Evaluation_Framework050818.pdf*

While it is not an exhaustive list of all upstream double-counting studies, the summary table below provides an overview of the findings informing this presentation.

Utility or Jurisdiction	Title	Author	Year	Approach to Upstream Savings	Double-Counted Savings as a %	Double-Counted Savings in Units	Notes	Public Link
Bonneville Power Administration	Clark Public Utilities Home Energy Reports Program Evaluation Final Report	Navigant	2015	Secondary	0%	-	Examines "behavior effect" weighed against "install effect"	https://www.bpa.gov/EE/Utility/research-archive/Documents/Evaluation/Clark-PUD-HER-Evaluation-July2015.pdf
Pennsylvania State	-	-	2018	Deemed Adjustment Factor	0.75% to 3.0%	-	State TRM Section 6.1.1.8.2	http://www.puc.pa.gov/Electric/pdf/Act129/SWE_PhaseIII-Evaluation_Framework050818.pdf
Puget Sound Energy	PSE's Home Energy Reports: 2012 Impact Evaluation	KEMA, Inc.	2013	Telephone Survey of Past Bulb Purchases	-	0 kWh		http://www.oracle.com/us/industries/utilities/puget-sound-energy-home-3631948.pdf
Pacific Power	Washington Home Energy Reporting Program: 18-month Evaluation Report	Navigant	2014	Telephone Survey of Currently Installed Bulbs	0%	-	Found no statistically significant difference in installed bulbs between treatment and control customers	http://www.pacificorp.com/content/dam/pacificorp/doc/Energy_Sources/Demand_Side_Management/2014/PP_WA_Home_Energy_Reports_Evaluation_6-23-2014.pdf
Efficiency Vermont	Evaluation of Residential Customer Behavioral Saving Pilot	Cadmus	2016	Telephone Survey of Past Bulb Purchases	-	0 kWh	Found no statistically significant difference in bulbs puchased between treatment and control customers	http://publicservice.vermont.gov/sites/dps/files/VT%202015%20HER%20Behavior%20Pilot%20Evaluation%20Report.pdf

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Pacific Gas & Electric	Evaluation of Pacific Gas and Electric Company's HER Program	Freeman, Sullivan and Company	2013	On-site Home Inventory	2.6%	-	Reported as "a borderline result with zero hovering at the border of the confidence interval"	https://aceee.org/files/proceedings/2014/data/papers/7-1290.pdf
Pacific Gas & Electric	Evaluation of Pacific Gas and Electric Copanys HER Program	Freeman, Sullivan and Company	2013	In-person Survey of Past Bulb Purchases	0%	-	Found no statistically significant difference in bulbs purchased	https://aceee.org/files/proceedings/2014/data/papers/7-1290.pdf
San Diego Gas & Electric	Impact Evlauation of 2015 SDG&E HERs and Manage-Act-Save Programs	DNV GL	2017	Online Survey of Past Bub Purchases	-	11.1 kWh for Wave 1, negative 0.9 kWh for Wave 2 (per hh per year)	Positive double-counted savings for one wave, and negative for the other	http://www.calmac.org/publications/DNVGL_SDGE_HERs_2015_final_to_calmac.pdf
Independent Electricity System Operator	2016 Social Benchmarking Impact Evalauation	Nexant	2018	Secondary	-	5.7 kWh (per hh per year)	Uses assumptions based on other studies to estimate double-counting	http://www.ieso.ca/-/media/Files/IESO/Document-Library/conservation/EMV/2017/2017-Social-Benchmarking-Evaluation-Report.pdf?la=en
California IOUs	Lighting Savings Overlap Estimate for 2014 IOU HER Programs	TRC	2016	Secondary		0.1 kWh to 9.2 kWh (per hh per year)	Uses inputs from multiple CA studies; varies by length of HER treatment, wave and utility	http://www.calmac.org/publications/Final_HER_2014_Upstream_Lighting_Savings_OverlapES.pdf

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Michigan currently has a robust approach to accounting for behavioral savings double-counting.

- DTE and CE apply rigorous channeling methods to subtract off any downstream program savings that could be double-counted with behavior savings
  - Michigan evaluators consult the following best-practice documents cited in the MI BRM to account for downstream double-counting:
    - Department of Energy's (DOE) Uniform Methods Protocol (UMP) Chapter 17 in calculating downstream program uplift: https://www.nrel.gov/docs/fy17osti/68573.pdf
    - SEE Action Network's 2012 best practices report on behavioral program savings measurement: https://www4.eere.energy.gov/seeaction/system/files/documents/emv_behaviorbased_eeprograms.pdf

- DTE and CE will consider options to account for upstream program double-counting, *but recognize this is above and beyond typical accounting and deals with a small, temporary issue*
  - Many states and jurisdictions do not account for upstream double-counting
  - Some have conducted primary research
  - Others use deemed adjustment values
  - Michigan must weight the pros and cons of each option

Michigan must consider the pros and cons of various approaches, given upstream double-counted savings are likely small and temporary.

- Each potential methodology to account for upstream lighting savings has associated benefits and costs
  - While home-visit/audit methods may be more reliable than survey-based methods, customer inability to identify program-incented bulbs is an issue, and the cost of these studies limits feasibility due to large sample size needs
  - Surveys can be a cost-effective large-scale approach, but recall bias and inability to identify program-incented bulbs may bias results
  - Both survey and home-visit approaches are subject to “behavioral effect” concerns, resulting in over-penalization of behavior programs
  - Adopting deemed or “default” values to account for upstream lighting savings (as done in PA and IL) is a low-cost option