

Michigan Behavioral Resource Manual Behavior Modification Report Calibration Assessment



Draft Slides for Internal Discussion



Agenda

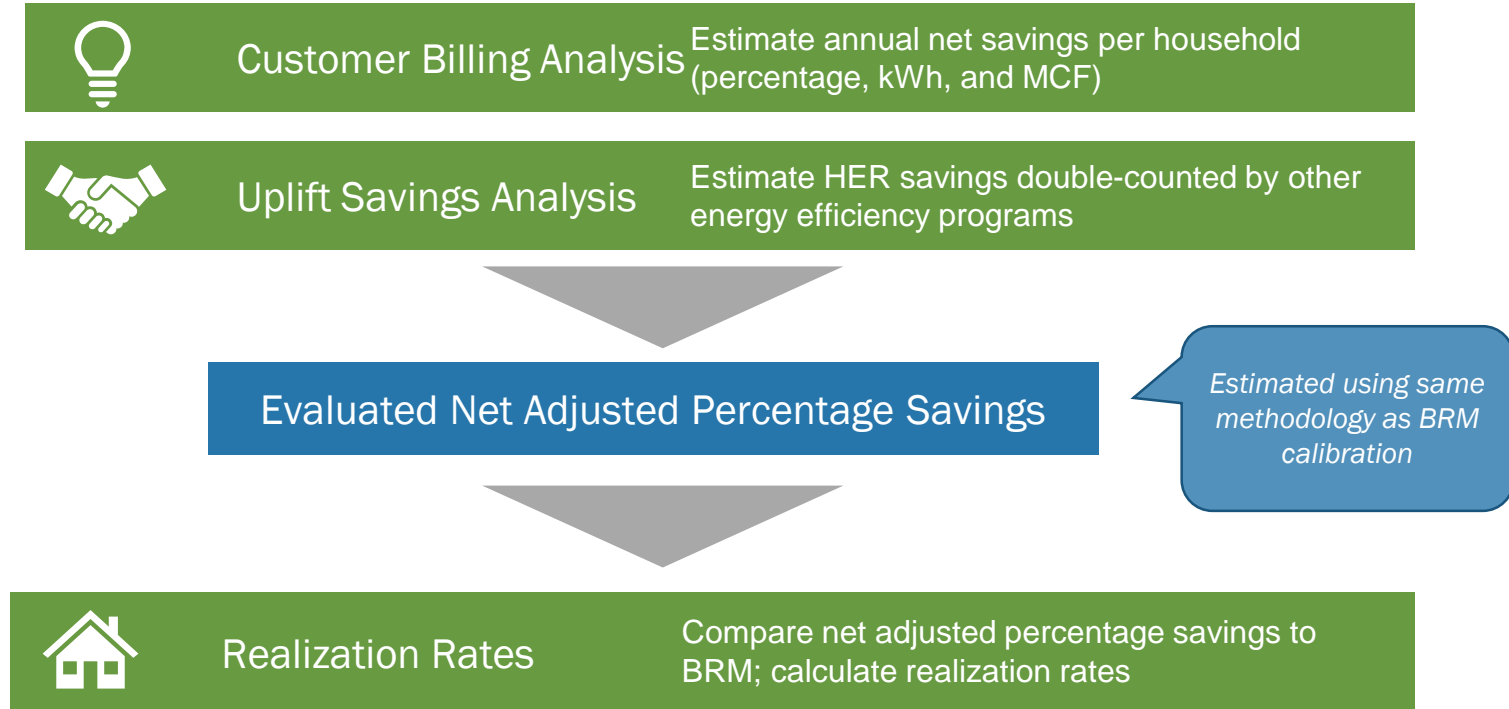


Background

- The Behavior Resource Manual (BRM) requires annual verification of behavior measures
 - “Third-party evaluation teams will review verification results across Michigan utilities, comparing to BRM savings values, and complete a calibration needs assessment as part of the “Existing Measure Review and Calibration Process” outlined in the Michigan Energy Measure Database Overview and Maintenance Process Manual.”
- The 2019 BRM includes only one measure
 - Home Energy Reports
- Annual verification was completed in August 2019

Realization Rates

The evaluation teams used the same methodology as the BRM to estimate net adjusted percentage savings



$$\begin{array}{l} \text{Realization Rate (RR)} \\ \text{of Percentage} \\ \text{Savings} \end{array} = \frac{\text{Evaluated net adjusted percentage savings}^*}{\text{2018 BRM assumption of deemed percentage savings}}$$

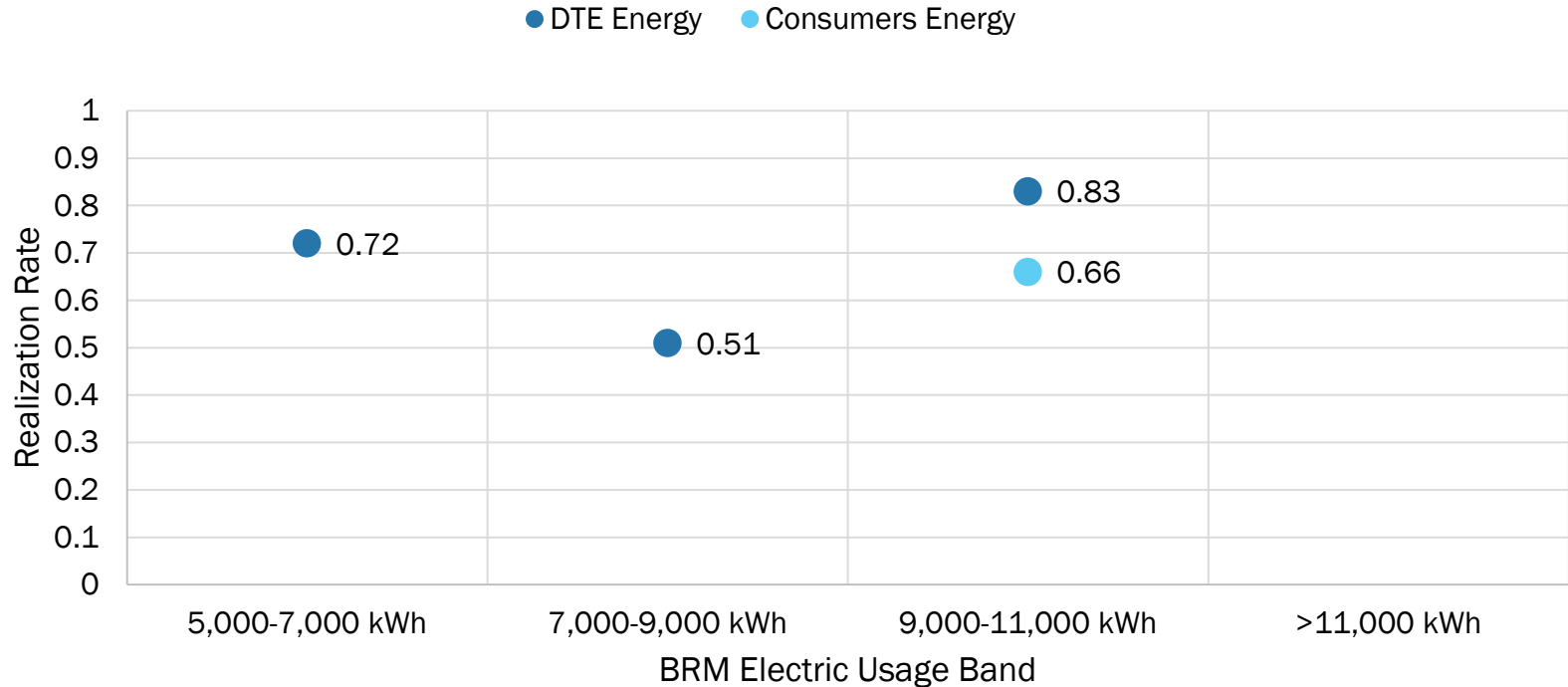
DTE Considerations

- Evaluated period: Calendar/program year 2018
- Savings were claimed for this period using the 2018 BRM deemed percentage savings.

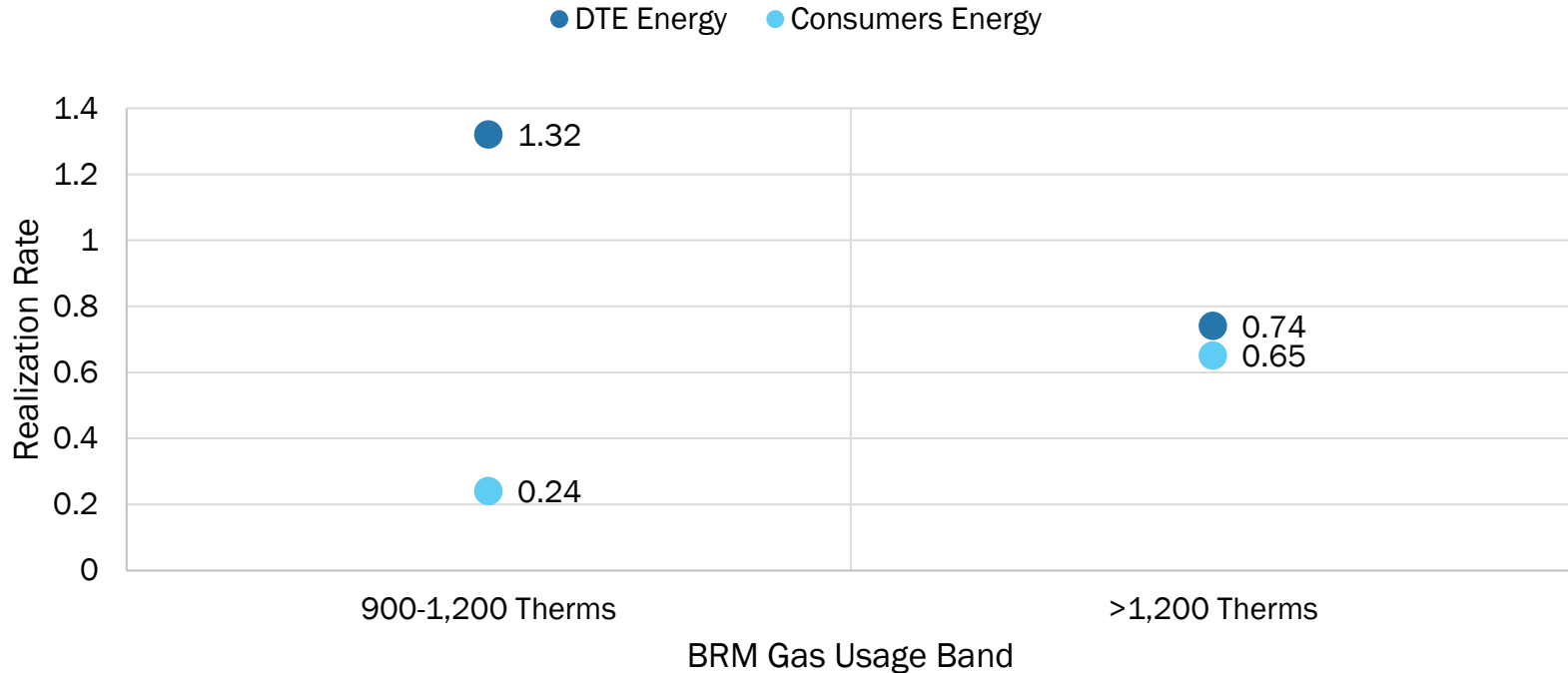
Consumers Energy Considerations

- Evaluated period: Treatment year 2017-2018
- Savings were claimed for this period using the 2017 MEMD
- RRs in this presentation use the formula above, for apples-to-apples comparison

2018 Electric Realization Rates by Usage Band



2018 Gas Realization Rates by Usage Band

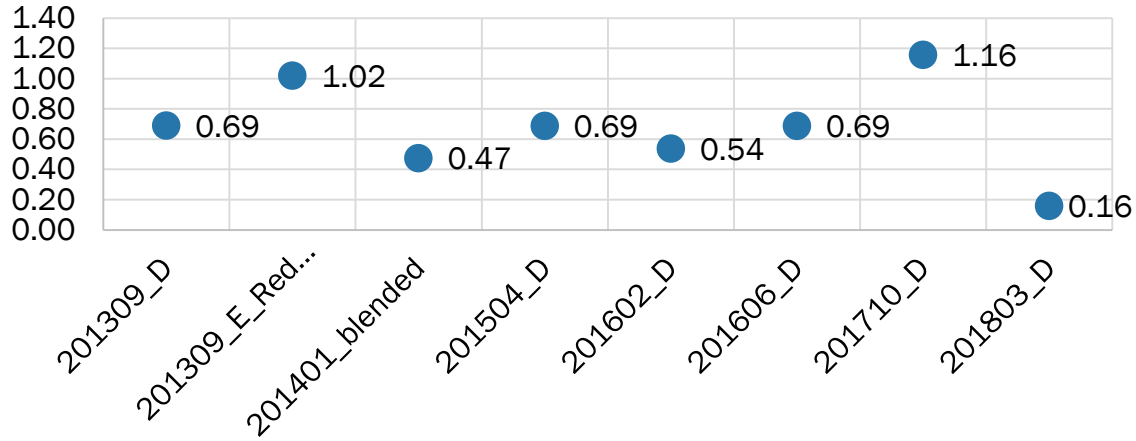


Weighted Average Realization Rates

	DTE Energy (Calendar Year 2018)	Consumers Energy (Treatment Year 2017-2018)
Electric	73%	66%
Natural Gas	91%	31%

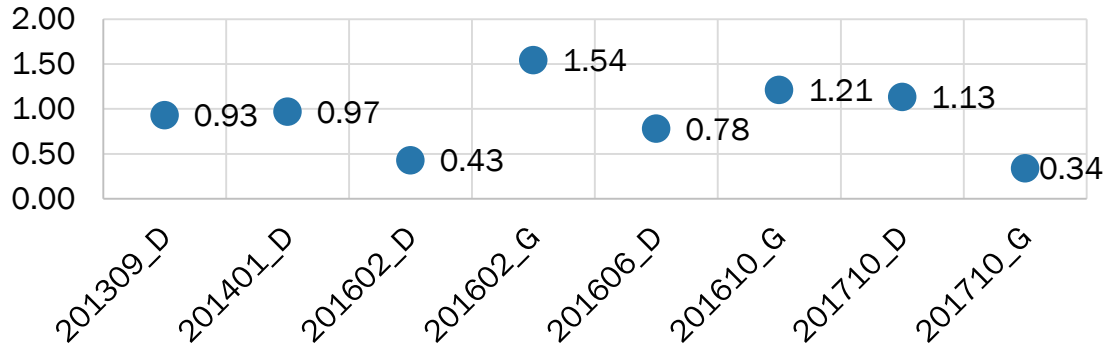
DTE Realization Rates by Program Track

Electric



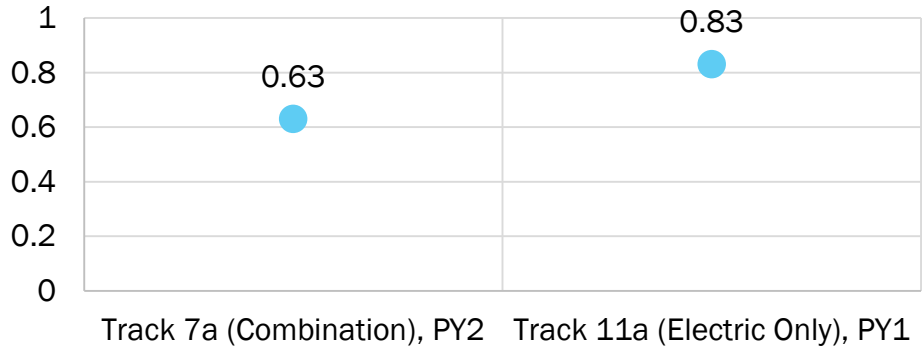
*Cohort names follow this structure: YYYYMM_FuelType. E.g., 201309_D is a dual fuel wave launched in September of 2013.

Gas

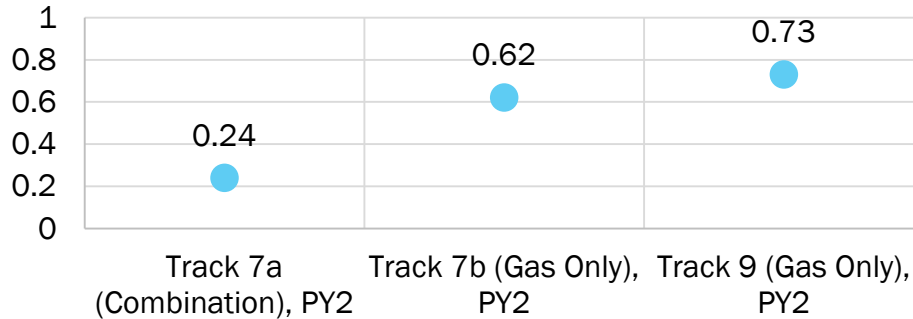


Consumers Energy Realization Rates by Program Track

Electric



Gas



Consumers Energy only evaluated tracks whose treatment and control groups were equivalent and large enough to potentially yield statistically significant savings estimates

Combination fuel track 7a comprises 81% of electric and 71% of natural gas savings for the HER program

Program Design Context

3. Measure Description

The Home Energy Reports program provides residential households accurate and timely information on their energy consumption through a variety of communication methods to change the consumers' energy usage behavior.

The Home Energy Reports program is organized around two concepts. First, motivate consumers through normative messaging to change their energy-use behavior. Personalized neighbor comparisons based on the size of the home, location, and heating fuel type—among other criteria—give households a motivational benchmark for their energy usage. Second, provide them with salient, personalized advice to capitalize on this motivation to use less energy and save money.

Home Energy Reports are **delivered through direct mail** and are often supplemented with digital communications such as email, the web, mobile phones, and social networks. This platform approach ensures that all households can access this information in the most effective way.

4. Measure Specification

Behavior Modification Reports are a tool that can be deployed to residential customers to drive a behavioral change to reduce home energy consumption. Key information includes:

1. Comparison of the customer's home energy use to neighbors' energy usage
2. An energy consumption grade
3. Comparison of the current period's energy usage with a past period's use and comments on increased or decreased energy utilization
 - a. Typically, this compares the current month or quarter with the same month or quarter from the prior year.
4. Suggested actions the customer can take to improve energy efficiency including some low or no cost ideas, as well as higher impact ideas that may require capital expenses

In addition, the program must have a simple opt-out process.

Changes in program design since HER savings assumptions were last calibrated (i.e., pre-2016 program data)

DTE

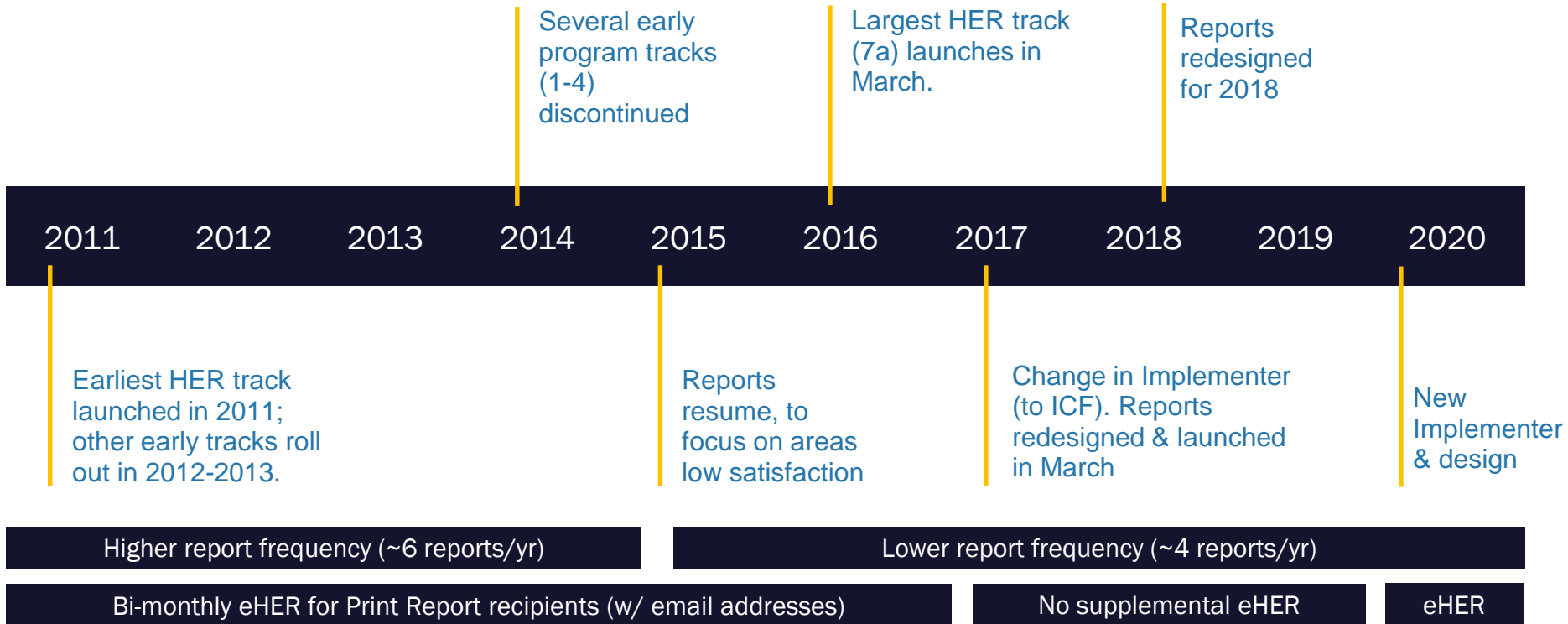
- Over time implementation has changed such that **fewer print and email reports** are being sent (e.g., average of 6-9 print reports and 12 email reports in 2014, down to 3-5 print reports and 10 email reports in 2018).

Consumers Energy

- **Reduction in print report frequency** over time: About 6 print reports/year through 2014; about 4 per year from 2015-2019.
- **Bimonthly eHERs discontinued** in 2017 (delivered through 2016; resumed in mid-2019).
- **Change in implementer and report design:** Report design (layout, charts, look and feel) changed for the 2017 and 2018 program years.

Both programs have been in compliance with the MEMD Whitepaper measure definition for the life of the HER program (2011-2019)

Consumers Energy Print HER Program Changes



Program updates for 2020 should deliver higher savings and real-time performance monitoring.

eHER integration (monthly or bimonthly):

Implementer proposed monthly eHERs, following the first print report. This is an improvement over 2017-2018 (no eHERs from 2017 through mid 2019)

Well-tested report design: The program will use implementer's off-the-shelf template that's been tested across the country.

Combined feedback for Combination customers:

Combination-fuel customers will see information for both fuels on all reports. The 2017-2019 reports alternated fuel information (two reports per year with electric information and two with gas information).

Considering discontinuing underperforming

tracks: May discontinue tracks that began in 2016 that have been exposed to multiple report designs (including track 7a with lowest realization rates)

Quarterly savings estimates: Implementer will provide quarterly performance estimates starting in summer 2020.

Print HER frequency (# reports/year) will not change: Still 4 per year, likely launching in March

Calibration Needs Assessment

- Measures, including those in the BRM, are prioritized for calibration research based on four key criteria:

Expected contribution to stakeholder portfolio savings estimates (i.e., a large share of current or future planned savings)

Savings calculation uncertainty

Expected data availability and timing (from updated codes, ongoing studies, etc.)

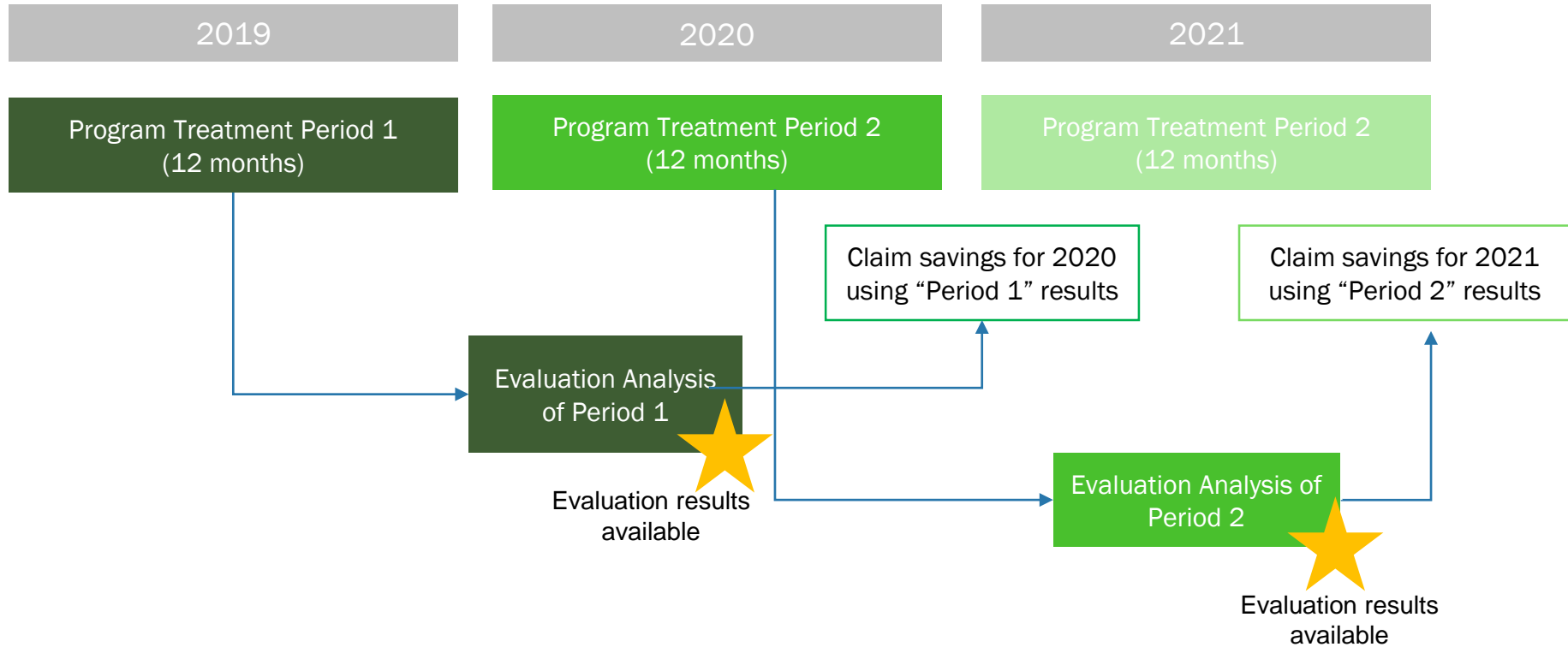
Length of time since the last modification, review, or calibration activity for a given measure

- Based on these four criteria, the HER program shows a need for calibration
 - However, planned 2020 program design changes mean immediate calibration would produce estimates that do not reflect the program design when calibration is complete

Options for Aligning Claimed Savings with Achieved Savings

Options	Description	Pros	Cons
Calibration Study	Perform calibration research to update the BRM	Adheres to the process as defined in the BRM	Due to changes in program design and implementation, a calibrated results would not be representative of future program savings. Potential equity issues between two utilities.
Custom Evaluation	Perform a custom evaluation using billing analysis following the end of each year, and apply results and claim savings	Savings claimed represents true savings achieved by the program. Annual billing analysis already required by BRM.	Incorporating billing analysis results within the existing timeline presents a challenge and potential risk to timely reconciliation. Presents challenges for program planning.
Adjustment Factors for BRM Savings	Develop adjustment factors to BRM percentages based on realization rates from prior custom evaluation (annual verification)	Savings claimed more closely represent true savings achieved by the program. Could be utility-specific if desired.	For Consumers Energy, an adjustment factor developed from 2017-2019 savings will not represent 2020 program design
Prospective Custom Adjustment	Perform custom/billing analysis and apply the savings per treatment customer the following year	Has precedent in current Consumers C&I custom program. Facilitates annual program planning.	Results in a one-year savings lag.
Incomplete year Custom Evaluation	Perform custom/billing analysis prior to the end of each year, and apply results and claim savings	Would allow sufficient time for Billing analysis to meet reconciliation deadline without undue burden.	Analysis would be based on incomplete data each year.

Illustration of Prospective Custom Adjustment Process



- Few other states use deemed savings values
- Other approaches:
 - Annual evaluation* where programs wait to claim savings until evaluation results are ready (~6-12 month lag)
 - Annual evaluation* where the previous year's realization rate is applied to current-year results
(RR calculated as evaluated to implementer-provided savings and applied to implementer-provided savings results)
 - Use only implementer-provided values (after evaluators confirm stability/accuracy of implementer estimates)

*Some states may perform biannual evaluation and use realization rates from prior years in the evaluation “off-years”

Appendix A

Detailed Realization Rates

Electric Realization Rates

BRM Usage Band	Deemed Savings ¹	Custom Estimates of Savings ¹	Realization Rate
> 11000 kWh	NA	NA	NA
9000-11000 kWh	2.09%	1.72%	0.83
7000-9000 kWh	2.03%	1.05%	0.51
5000-7000 kWh	0.74%	0.53%	0.72

Gas Realization Rates

BRM Usage Band	Deemed Savings ¹	Custom Estimates of Savings ¹	Realization Rate
>1200 Therms	0.58%	0.77%	1.32
900-1200 Therms	0.67%	0.50%	0.74

1. Deemed and Custom Savings are a weighted average of cohort-specific savings, weighted by the number of active participants in each cohort.

Electric Realization Rates

Cohort	BRM Usage Band (kWh)	Nth Year	Deemed Savings	Custom Estimates of Savings ¹	Realization Rate
201309_D	9000-11000	6	2.12%	1.46%	0.69
201309_E_Reduced	9000-11000	6	2.12%	2.16%	1.02
201401_blended	7000-9000	5	2.01%	0.95%	0.47
201504_D	7000-9000	4	2.27%	1.56%	0.69
201602_D	9000-11000	3	1.77%	0.95%	0.54
201606_D	7000-9000	3	1.82%	1.25%	0.69
201710_D	5000-7000	2	0.77%	0.89%	1.16
201803_D	5000-7000	1	0.70%	0.11%	0.16

Gas Realization Rates

Cohort	BRM Usage Band (Therms)	Nth Year	Deemed Savings	Custom Estimates of Savings ¹	Realization Rate
201309_D	900-1200	6	0.73%	0.68%	0.93
201401_D	900-1200	5	0.69%	0.67%	0.97
201602_D	900-1200	3	0.91%	0.39%	0.43
201602_G	>1200	3	0.57%	0.88%	1.54
201606_D	900-1200	3	0.91%	0.71%	0.78
201610_G	>1200	3	0.57%	0.69%	1.21
201710_D	>1200	2	0.60%	0.68%	1.13
201710_G	900-1200	2	0.53%	0.18%	0.34

1. Custom estimates of savings are based on regression analysis of HER recipient and control customers billing data.

Electric Realization Rates

BRM Usage Band	Deemed Savings ¹	Custom Estimates of Savings ²	Realization Rate ³
> 11000 kWh	N/A		
9000-11000 kWh	1.45%	0.95%	66%
7000-9000 kWh	N/A		
5000-7000 kWh	N/A		

Gas Realization Rates

BRM Usage Band	Deemed Savings ¹	Custom Estimates of Savings ²	Realization Rate ³
>1200 Therms	0.60%	0.39%	65%
900-1200 Therms	0.53%	0.13%	24%

1. Deemed and Custom Savings are a weighted average of cohort-specific savings, weighted by the number of active participants in each cohort.
2. Custom estimates of savings are based on regression analysis of HER recipient and control customers billing data, and are adjusted for uplift savings
3. Realization rates compare adjusted net percentage savings for the 2017-2018 program period with BRM percentage assumptions. These RRs differ from what is Consumers Energy's Final HER Program Evaluation Report for 2017-2018 because savings were claimed using 2017 MEMD assumptions.

Electric Realization Rates

Cohort	BRM Usage Band	Nth Year	Deemed Savings ¹	Custom Estimates of Savings ²	Realization Rate ³
Track 7a (Combination)	9000-11000	2 nd	1.52%	0.96%	63%
Track 11a (Electric Only)	9000-11000	1 st	1.08%	0.90%	83%

Gas Realization Rates

Cohort	BRM Usage Band	Nth Year	Deemed Savings ¹	Custom Estimates of Savings ²	Realization Rate ³
Track 7a (Combination)	900-1200	2 nd	0.53%	0.13%	24%
Track 7b (Gas Only)	>1200	2 nd	0.60%	0.37%	62%
Track 9 (Gas Only)	>1200	2 nd	0.60%	0.44%	73%

1. Deemed and Custom Savings are a weighted average of cohort-specific savings, weighted by the number of active participants in each cohort.
2. Custom estimates of savings are based on regression analysis of HER recipient and control customers billing data, and are adjusted for uplift savings
3. Realization rates compare adjusted net percentage savings for the 2017-2018 program period with BRM percentage assumptions. These RRs differ from what is Consumers Energy's Final HER Program Evaluation Report for 2017-2018 because savings were claimed using 2017 MEMD assumptions.

Appendix B

Uplift Savings: Consumers Energy

Consumers Energy Uplift Savings

Track	Savings Estimate Program Year	Evaluated Net Savings per Household	Evaluated Net Savings per Household (kWh or MCF; prorated) ^a	Uplift Savings per Household (kWh or MCF; prorated) ^b	Uplift Savings as Percentage of Evaluated Net Savings
Electric Savings					
7a	PY1	0.58%	53.3	1.7	3%
	PY2	1.02%	84.4	4.7	6%
11a	PY1	0.93%	78.8	2.7	3%
Natural Gas Savings					
7a	PY1	0.07%	0.06	0.03	54%
	PY2	0.25%	0.22	0.11	48%
7b	PY1	0.48%	0.85	0.01	2%
	PY2	0.37%	0.61	-0.03	0%
9	PY1	0.43%	0.66	0.05	8%
	PY2	0.49%	0.82	0.08	10%

Electric uplift savings, as a percentage of evaluated net savings, are within the expected range

Uplift savings for natural gas-only tracks are within expected range, while track 7a uplift savings look high due to low evaluated savings (small denominator)

^a The average annual net savings per household were prorated for the portion of the year that each customer was treated by the HER program, which may be less than 365 days due to account attrition (account closures and supplier choice) and to customer eligibility screening that occurred when the program implementer changed in 2017.

^b Joint (uplift) savings per household were adjusted to account for the portion of the year that downstream program measures were installed in each customer's home. For example, if a measure was installed halfway through the program year, only half of annual deemed savings for that measure were applied to this analysis.

Consumers Energy Uplift Savings

With the exception of natural gas savings for Track 7a, uplift savings have a small effect on net adjusted savings

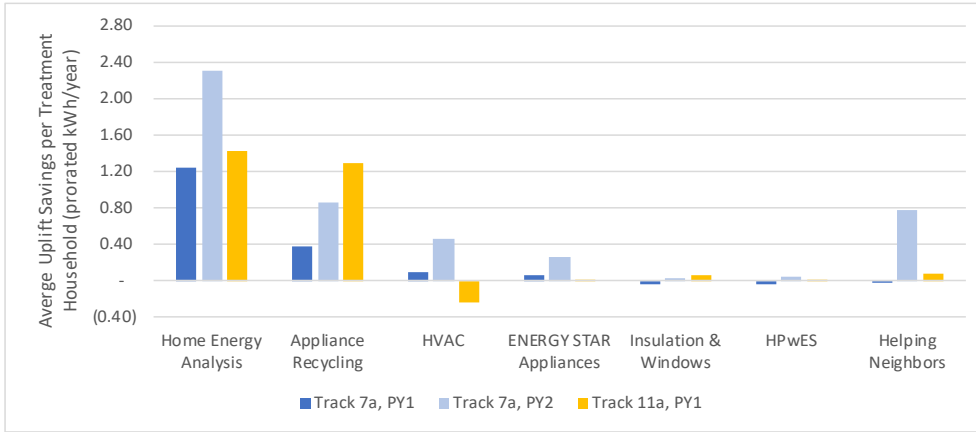
Track	Savings Estimate Program Year	Claimed Savings (MWh or MCF)	Unadjusted Results (before Cross-Participation Analysis)		Adjusted Results (after Cross-Participation Analysis)	
			Evaluated Net Savings (MWh or MCF)	Realization Rate on Total Energy Savings*	Adjusted Net Savings (MWh or MCF)	Realization Rate on Adjusted Energy Savings*
Electric Savings (MWh)						
7a	PY1	26,959	14,934	55%	14,459	54%
	PY2	36,357	21,104	58%	19,923	55%
11a	PY1	4,819	3,645	76%	3,521	73%
Natural Gas Savings (MCF)						
7a	PY1	151,741	15,743	10%	7,160	5%
	PY2	150,674	54,843	36%	28,466	19%
7b	PY1	34,141	25,539	75%	25,003	73%
	PY2	29,296	16,794	57%	16,794	57%
9	PY1	10,897	10,187	93%	9,372	86%
	PY2	13,626	9,942	73%	8,913	65%

Highlighted rows contain findings for the 2017 to 2018 program period (billing analysis results reported in this evaluation). For other rows, findings from the 2016 to 2017 billing analysis (unadjusted savings) were reported in the prior evaluation, but cross-participation analysis is first reported in this evaluation.

*Realization rates in this chart are DIFFERENT from the rest of this presentation because they are based on claimed savings (which used the MEMD), and total savings versus percentage savings (introducing other small differences)

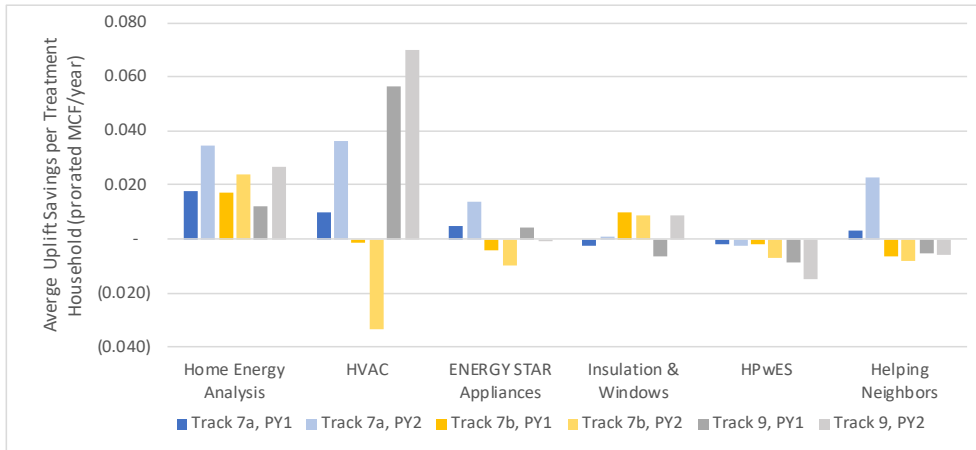
Uplift Savings by Program

Electric



The HEA and Appliance Recycling programs comprise the majority of double-counted electric savings

Natural Gas



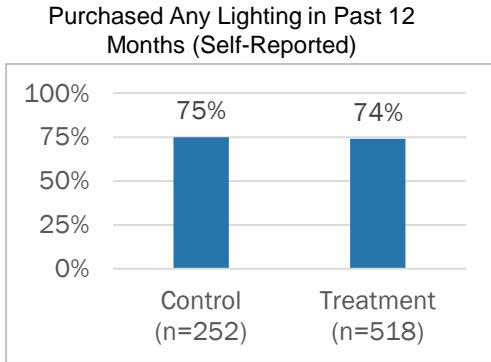
The HEA and HVAC programs comprise the majority of double-counted natural gas savings

There is some “negative” uplift where the control group participated at higher rates

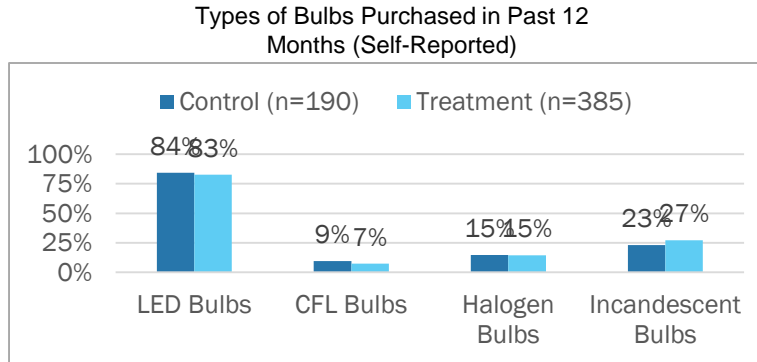
What about Upstream Lighting?

Upstream lighting savings are not included in joint (uplift) savings estimates since purchasers are not tracked at the account level

- The 2019 HER customer survey revealed no differences in self-reported efficient lighting uptake between treatment and control (see figures below)
- Several utilities have attempted to estimate upstream lighting uplift savings and found small (but still possible) double-counted savings from upstream lighting (Source: Tetra Tech. May 26, 2017. *Residential Behavioral Program Impact and Process Evaluation*. Prepared for MidAmerican Energy Company.)



Source: 2019 HER Customer Survey. "Please indicate whether you completed any of the following home projects in the last 12 months." Response option 1 was "Purchased or installed new light bulbs."



Source: 2019 HER Customer Survey. "What type of light bulb(s) did you purchase or install?"