



**DTE Energy**<sup>®</sup>

**Behavior Program Measures for  
Submission to 2015 MEMD**

- Year Three Energy Savings
- Demand Savings

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In conjunction with:



# Introduction

- Michigan has adopted deemed values for Home Energy Reports type Residential behavior programs based on the actual savings observed in two large-scale pilot programs conducted by DTE Energy and Consumers Energy
  - Year One savings values were added to the MEMD for 2013
  - Year Two savings values were added to the MEMD for 2014
- Similarly, Consumers Energy and DTE Energy are submitting Year Three savings values for inclusion in the 2015 MEMD
  - Again they are based on the combined actual experience of the two companies on-going pilots
  - Preliminary results/whitepapers were submitted to the Technical Subcommittee April 1

Group	High Usage Electric	Average Usage Electric	Gas
Savings	1.82%	1.44%	0.79%

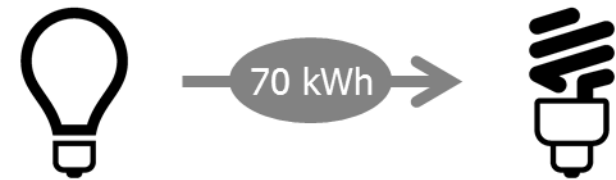
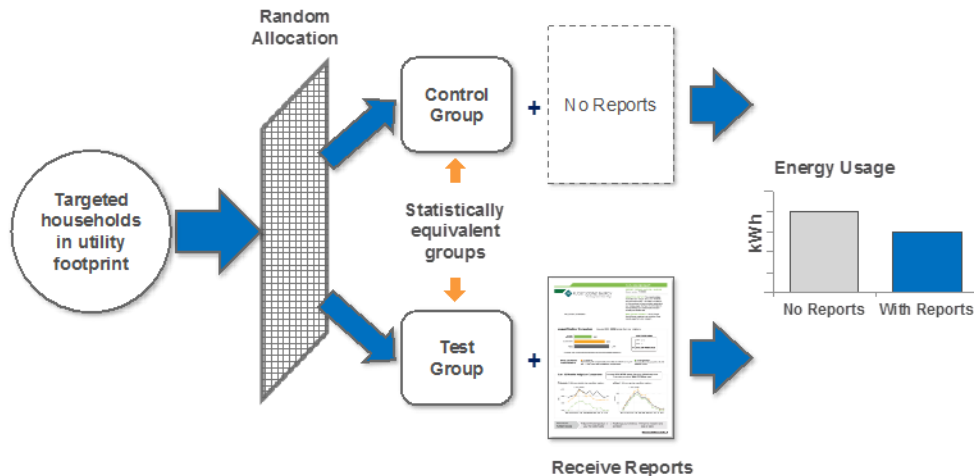
- Savings values to be update with full 12-months post data by June 1
- The companies are also submitting proposed Peak Demand Savings values based on analysis of AMI data from a number of different companies, including Consumers Energy

- **MEMD Process for Residential Behavior Measures**
- Year three Savings
- Peak Demand Savings

## Behavior and hardware have different approaches to measuring savings

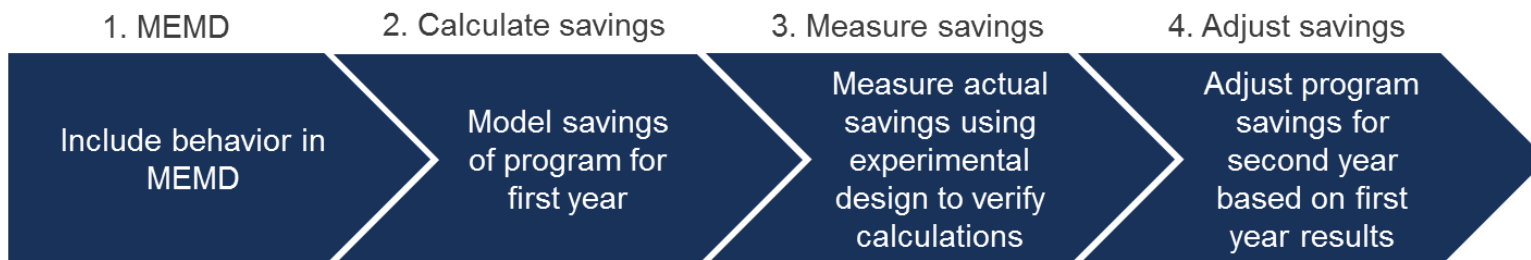
Behavior savings are measured *ex post* using experimental design

Hardware savings are deemed *ex ante* using a database of approved values



## Deem and verify, a hybrid approach

### Process



### Example calculations



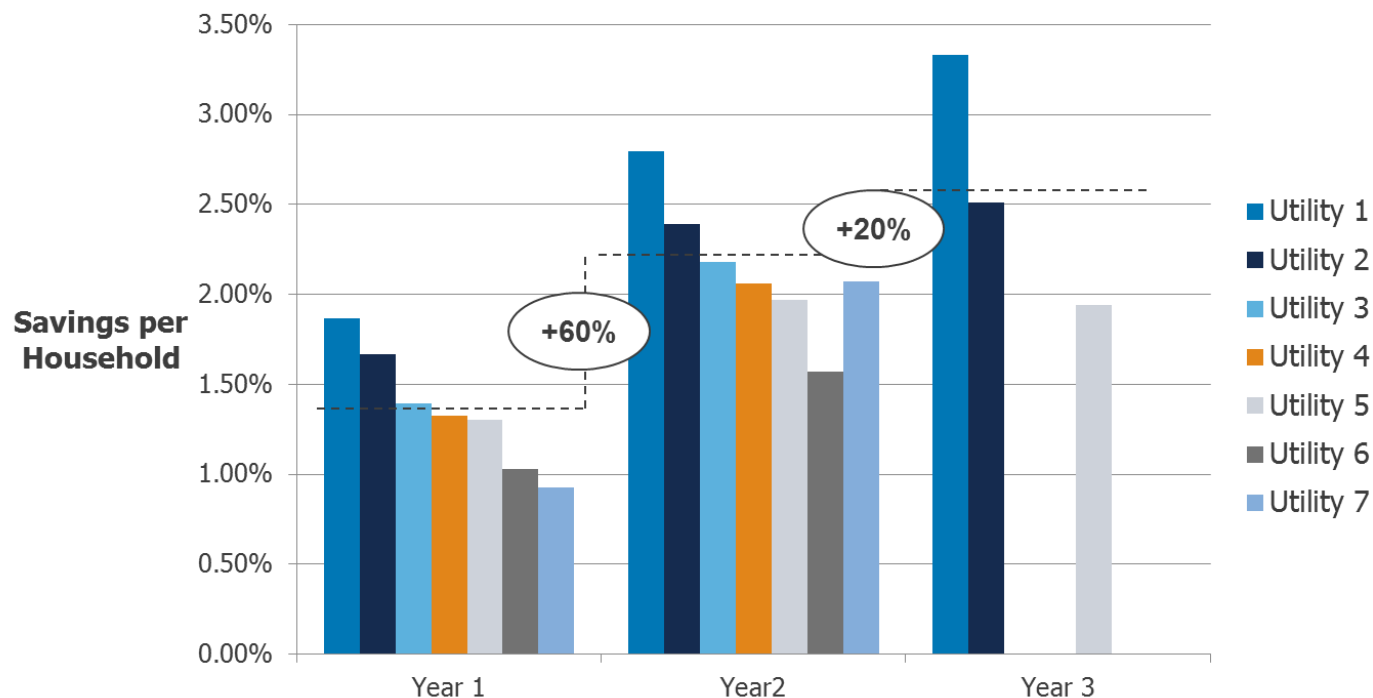
#### Notes:

\*\* All savings figures and calculations are demonstrative abstractions, rather than real numbers

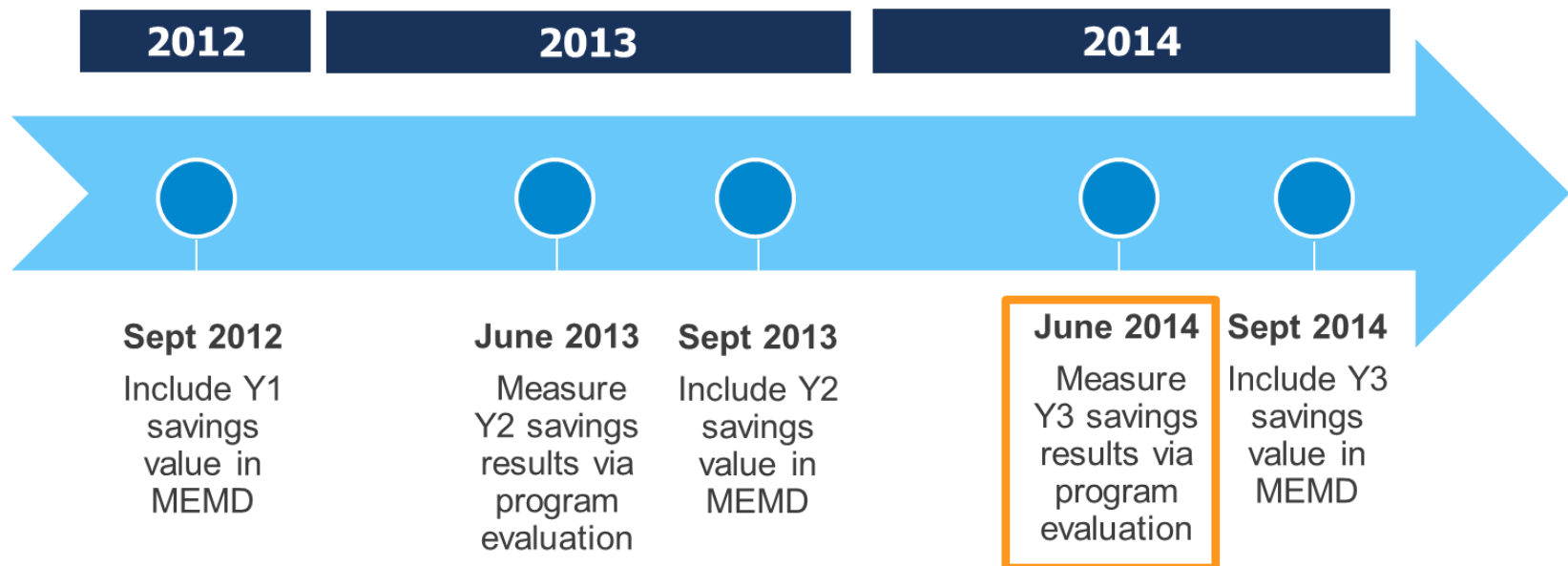
## Results Improve Over Time

Results from 7 Midwest deployments show consistent improvement from Year 1 to Year 2, and continued improvement in Year 3

### Savings Rates Over Time, Midwest Deployments



## MEMD Update Process



## Benefits of Deem and Verify Approach

### Summary

The deem and verify hybrid approach:

- » Provides **consistency** with both the existing approach in Michigan and the accepted best practice for behavioral programs
- » Creates **certainty** for regulatory treatment of behavioral programs similar to the certainty that applies to hardware
- » Uses experimental design to **verify** savings values on an ongoing basis
- » Provides a mechanism for **adjusting** savings as needed going forward



# Agenda



- MEMD Process for Residential Behavior Measures

- **Year three Savings**

- Peak Demand Savings

## Updated MEMD Savings Rate Values

Year 1 to Year 3 Results Side-by-Side

	Year 1 Savings Rate	Year 2 Savings Rate	Year 3 Savings Rate*	Usage Band
Electric High Usage Band	1.20%	1.68%	1.82%*	9k – 11k kWh
Electric Average Usage Band	1.05%	1.34%	1.44%*	7k – 9k kWh
Gas Usage Band	0.64%	0.71%	0.79%*	900 – 1,100 therm

**Notes:**

\* DTE and CMS Year 3 annual results are based on measured values for May 2013 through February 2014 and forecasts from March 2014 through end of April 2014 based on reported historical usage; numbers have been adjusted to back out increases in participation in other programs attributable to the behavioral programs using Y2 participation rates as placeholders.

## Updated Electric High Usage Band

DTE and Consumers Y3 program results (electric), May 1 2013 to April 30 2014

	Consumers	DTE	Michigan
Savings Rate	1.57%*	2.07%*	1.82%**
Usage Band	9,000 to 11,000 kWh		

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**Notes:**

\* DTE and CMS annual results are based on measured values for May 2013 through February 2014 and forecasts from March 2014 to end of April 2014 based on reported historical usage; numbers have been adjusted to back out increases in participation in other programs attributable to the behavioral programs.

\*\* Michigan-wide savings figure based on average of results from Consumers and DTE results

## Updated Electric Average Usage Band

DTE and Consumers Y3 program results adjusted for average usage in territory (electric), May 1 2013 to April 30 2014

	Consumers	DTE	Michigan
Savings Rate	1.22%*	1.67%*	1.44%**
Usage Band	7,000 to 8,999 kWh		

**Notes:**

\* DTE and CMS annual results are based on measured values for May 2013 through February 2014 and forecasts from March 2014 to end of April 2014 based on reported historical usage; numbers have been adjusted to back out increases in participation in other programs attributable to the behavioral programs.

\*\* Michigan-wide savings figure based on average of results from Consumers and DTE results

## Updated Gas Usage Band

DTE and Consumers Y3 program results (gas), May 1 2013 to April 30 2014

	Consumers	DTE	Michigan
Savings Rate	0.94%*	0.64%*	0.79%**
Usage Band	900 to 1,100 therm		

**Notes:**

\* DTE and CMS annual results are based on measured values for May 2013 through February 2014 and forecasts from March 2014 to end of April 2014 based on reported historical usage; numbers have been adjusted to back out increases in participation in other programs attributable to the behavioral programs.

\*\* Michigan-wide savings figure based on average of results from Consumers and DTE results

# Agenda



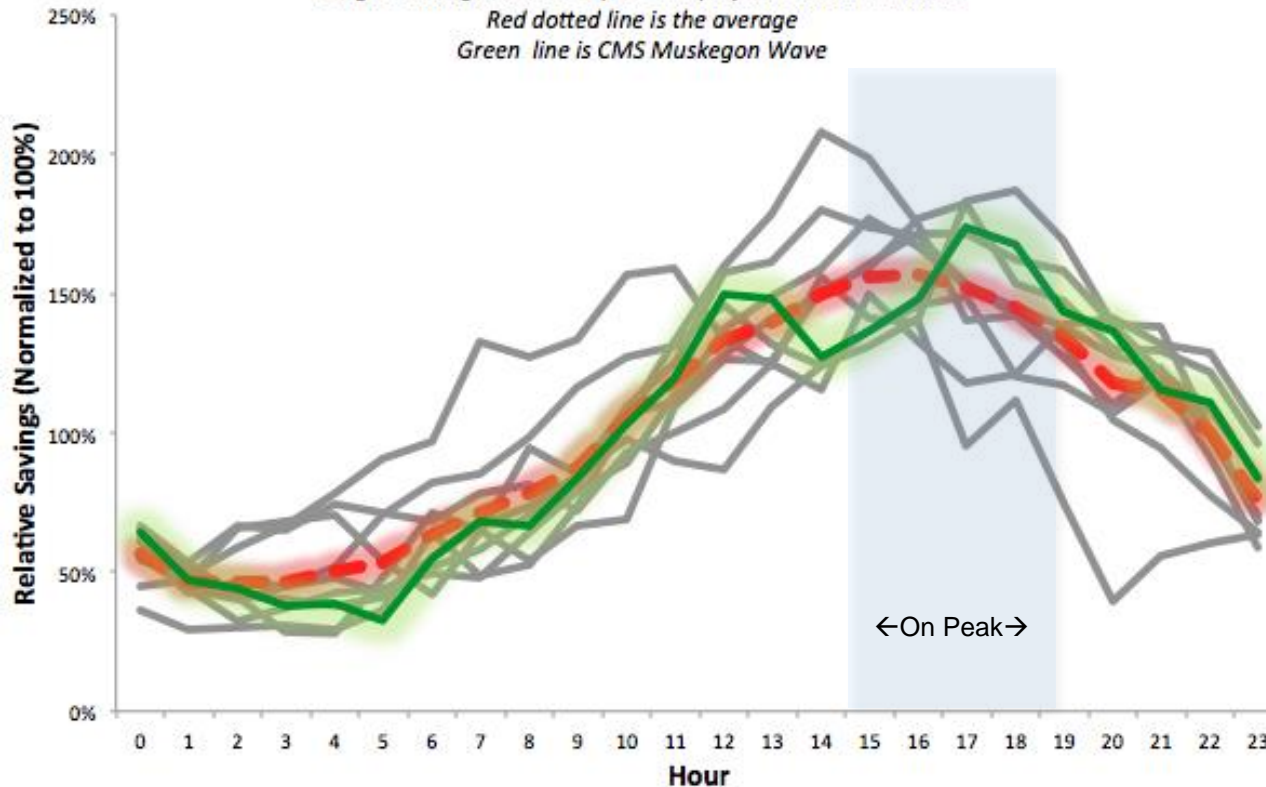
- MEMD Process for Residential Behavior Measures
- Year three Savings
- **Peak Demand Savings**

# Peak Demand Savings

## Summer intraday loadshapes were very similar across 10 HER deployments at 4 utilities with AMI metering

### When Savings Occur During the Day

August saving across 10 Opower deployments and 4 utilities  
 Red dotted line is the average  
 Green line is CMS Muskegon Wave



Analysis found savings in summer peak hours were 1.52 times the daily average rate for the four utilities.

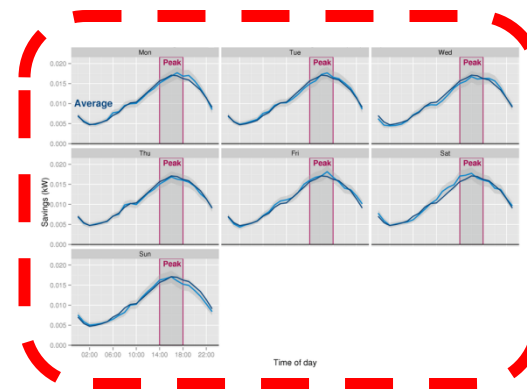
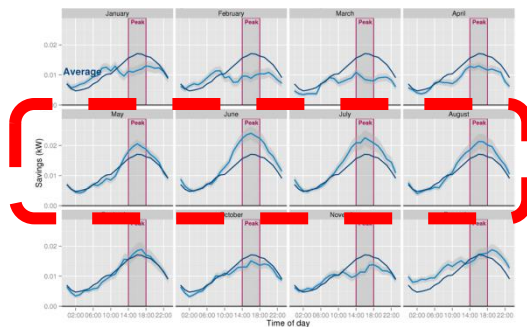
Consumers Energy (Green Line) had nearly identical results, 1.5 time the average savings rate.

Thus it is reasonable to assume on-peak hours have 1.5 times the energy (and, by extension, demand) savings of the average daily savings rate.

# Peak Demand Savings

The consistency of these results make this logic supportable even when AMI data is unavailable

- Peak savings results are **consistent**
  - Summer *and* winter (in colder climates)
  - Weekday *and* weekends
  - AMI *and* billing data powered reports
  - Electric only *and* dual fuel
  - Multiple climate zones and customer types
  - Sustained results over multiple program years
- Including benefits from peak savings should be the rule rather than the exception





# Peak Demand Savings

## Calculation of On-Peak Multiplier:

1. Gather AMI data history from 10 deployments at 4 utilities located in the west coast, midwest, and east coast, including 1 deployment at Consumers Energy
2. For each deployment and calendar month, calculate average kW savings/customer for each hour of the day using a difference-in-differences calculation (calculation outlined on p. 3 of work paper)
3. Normalize kW savings for each deployment by dividing the kW savings within each hour by the total kW savings across the day (grey lines in appendix A of work paper)
4. For the month of August, stack these normalized kW savings into a single graph and calculate an average normalized kW savings for each hour of the day (red dotted line in appendix A of work paper)

## Results:

Average kW savings from 2pm - 6pm is 1.5 times higher than average hourly kW savings across the entire day

This 1.5 multiplier persists across all days of the week (appendix B of work paper) and all summer months (appendix C of work paper)

# Peak Demand Savings

## Calculation of the Peak Demand Savings

1. Determine actual summer month average kW savings/customer (within current program year)
  - a) Difference in differences analysis (Treatment vs. Control) using current and prior year's summer month(s)' usage to get summer month(s) energy (kWh) savings/customer
  - b) Convert kWh savings to average demand savings (kW) by dividing the savings/customer by # of hours in summer month(s) included in the analysis

2. Calculate average on-peak summer month average kW savings/customer

Multiply the average summer month demand savings/customer by the **deemed** on-peak multiplier of 1.5

*Note: the multiplier is the only “deemed” part of the calculations. Using this allows us to accurately estimate on-peak demand savings until AMI meters are fully deployed and it can be directly measured.*

3. Calculate total kW savings for all actively participating customers

Multiply the average on-peak summer month demand savings/customer by the number of active participating customers

# Next Steps

- **Technical Subcommittee:**
  - Review preliminary work papers and results
    - Gain understanding of the concepts and approaches
    - Bring questions back to sponsors, CECo and DTE
  - Wait for/review June 1 submission of final numbers and work papers
    - Final Year 3 savings numbers based on full 12 months post data
    - DTE Energy data issues resolved
  - Approve “deeming” of both measures
    - Year 3 energy savings % (probably close to preliminary value of 1.82%)
    - Peak Demand Savings: approval of the 1.5 on-peak multiplier and calculation methodology
- **Incorporate proposed measures in 2015 MEMD**