

RESIDENTIAL GAS MEASURE IDENTIFICATION STUDY

MICHIGAN ENERGY WASTE REDUCTION (EWR)
COLLABORATIVE

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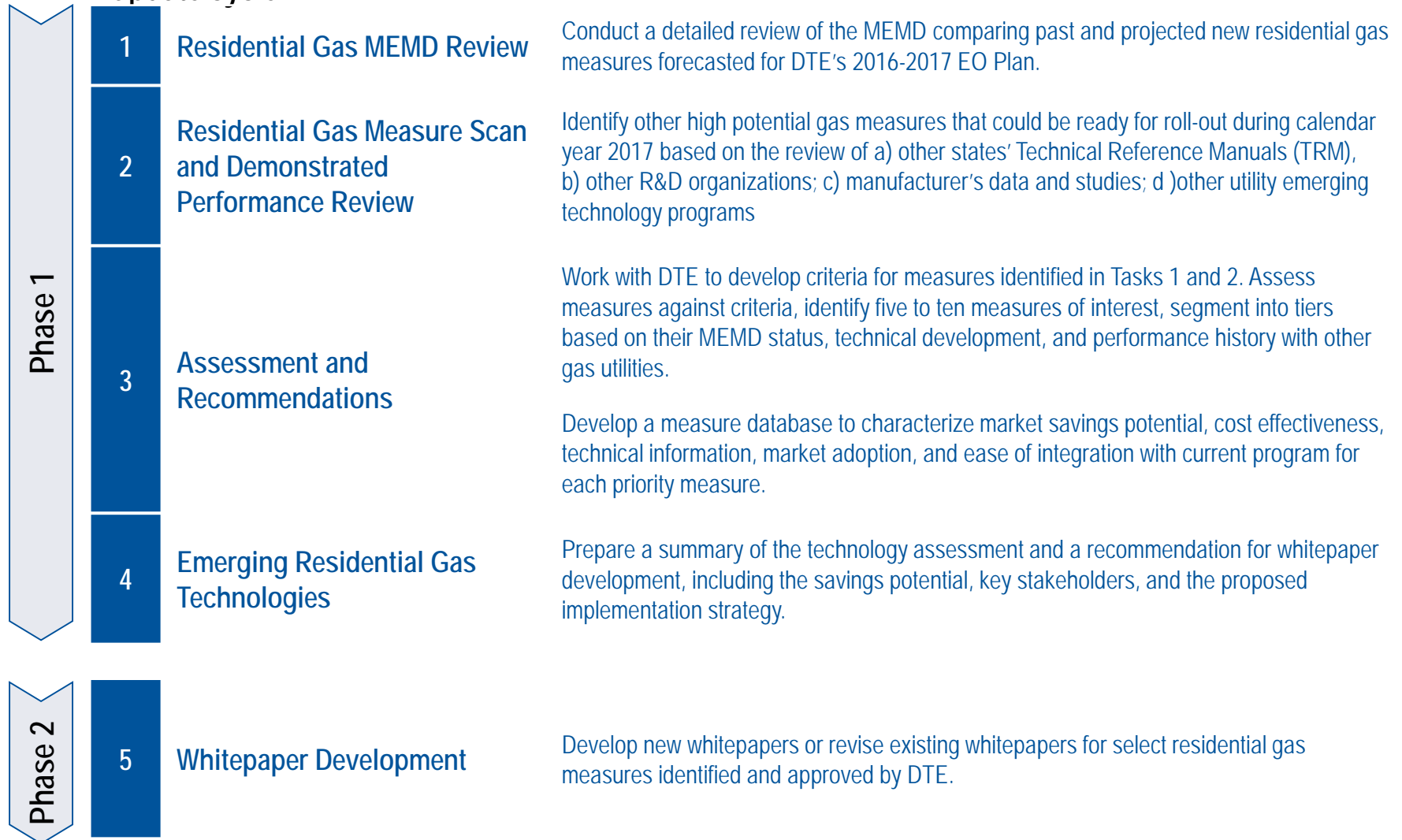
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DTE Energy (DTE) is seeking to identify residential natural gas measures that DTE can add to their program portfolio to meet energy savings goals for 2018 and beyond. Navigant conducted a measure scan in Q4 2016 to develop whitepapers for the most promising measures and submit during the 2017 MEMD update cycle.



Navigant reviewed the following Technical Reference Manuals (TRMs), utility efficiency portfolios, Research & Development programs, and other resources to identify measures that could be added to DTE's portfolio.

Measure Scan Resources	
DTE Portfolio	DTE's 2016-2017 EO Plan Michigan Energy Measures Database (MEMD)
State TRMs	NY, VT, MA, AR, WI, IL, MN, CA Municipal Utilities Association
Utility EE and ET Programs	Consumers Energy, Laclede Gas, National Grid, Ontario Gas, Peoples Gas, PG&E, SDG&E, SMUD, SoCalGas, Union Gas, Enbridge
R&D Organizations	DOE, GTI, CEE, NEEA, MNCEE, CA ETCC, Con Edison Gas Potential Report, BPA E3T, ACEEE, ESC, NEEP Others

After reviewing the initial list of 30 residential measures, DTE selected six measures for further analysis in Task 3.

Measures Selected for Task 3 Analysis	
ENERGY STAR Clothes Dryer	Residential gas clothes dryer that meets ENERGY STAR specification with energy saving features
Boiler Reset Controls	Outdoor reset controls for residential boilers modulate boiler setpoints based on outdoor temperature to reduce heat loss during moderate weather
Efficient Fan Controller	Adding an efficient fan controller to an ducted HVAC air handler (furnace & AC) can capture residual thermal energy in heat exchangers and ducts, which would otherwise be lost
Cold Water Default Clothes Washer	Residential clothes washer with a default setting for cold-water wash that reduces hot water consumption when combined with cold-water detergents
Air-to-Air Heat Recovery	Energy and heat recovery ventilators (ERV, HRV) transfer thermal energy from the home to precondition outside air for residential ventilation systems
Condensing Pool and Spa Heaters	Gas-fired pool heaters with thermal efficiencies >90%

In Task 3, Navigant worked with DTE to develop scoring criteria to evaluate the full list of measures and prioritize those most promising for DTE's energy efficiency portfolio.

Assessment and Recommendations	
OBJECTIVE	Identify a set of measures that show the greatest potential for DTE's energy efficiency portfolio.
APPROACH	<p>Develop scoring criteria and weighting factors for prioritization</p> <p>Screen any measures that clearly do not fit DTE's goals</p> <p>Perform a top-down assessment of achievable market potential</p> <p>Develop incentive and marketing approach for promising measures</p> <p>Develop measure database characterizing market savings potential, technical information, cost effectiveness, market adoption, and ease of integration with current program.</p>
DELIVERABLE	<p>Prioritized list of potential measures for DTE's 2017 energy efficiency portfolio</p> <p>Measure database</p>

Estimated Technical, Market, and 2016 Savings Potential for Residential Gas Measures

- » **Technical Savings Potential** – Unit energy savings percentage multiplied by the applicable baseline consumption and market/technology specific end-use percentages from the 2013 Michigan EE Potentials study.*

$$\text{Savings Potential MCF} = \text{End-Use Consumption MCF} \times \text{Unit Energy Savings \%} \times \text{Turnover \% (e.g., 1/EUL)} \times \text{Annual Market Participation \%}$$

- » **Market Savings Potential** – For replace-on-burnout measures, technical savings potential multiplied by the annual product turnover percentage (e.g., 1/EUL); retrofit measures assumed 100% potential.

$$\text{DTE Projected Achievable 2017 Units (Projects / yr.)} = \text{Annual Measure Participation in Utility A (Projects / yr.)} \times \frac{\text{DTE Res Customer Counts}}{\text{Utility A Res Customer Counts}}$$

- » **DTE 2016 Savings Potential** – Market savings potential multiplied by a participation factor (e.g., 1-5%) determined by scaling market participation histories for the measure at other gas utilities** and/or Navigant judgement based on the number of potential projects.

* GDS Associates. 2013. "Michigan Electric and Natural Gas Energy Efficiency Potential Study." Prepared for Michigan Public Service Commission. November 5, 2013. [link](#)

**AGA Utility Statistics – 2014 Ranking of Companies By Residential Sales Customers [link](#)

Navigant and DTE selected two of the six residential gas measures investigated in this research study to move forward for whitepaper development.

- » ENERGY STAR Clothes Dryer and Boiler Reset Controls (highlighted in green) have clear applicability for DTE's residential portfolio.
- » Cold Water Default Clothes Washer, Efficient Fan Controller, and Air-to-Air Heat Recovery (highlighted in yellow) can be valuable for DTE's programs, but will have a more limited market or require additional research.
- » Condensing Pool Heaters (highlighted in red) can be attractive for large single-family and multi-family customers, and would be more appropriate for a custom rebate when the opportunity arises.

Measure	Recommendation	Explanation / Note
ENERGY STAR Clothes Dryer	Develop Whitepaper	Good payback, increasing market availability
Boiler Reset Controls	Develop Whitepaper	Long payback, but established measure in state TRMs
Efficient Fan Controller	Consider Whitepaper	Good payback, potential for direct install, questionable savings
Cold Water Default Clothes Washer	Consider Whitepaper	Good payback, limited market availability
Air-to-Air Heat Recovery	Consider Whitepaper	Long payback, applicable for new construction mostly
Condensing Pool Heater	Remove	Custom only for residential market

The analysis suggests DTE has several opportunities to expand the current residential gas energy efficiency portfolio and achieve additional gas savings in 2017 and beyond.

- » Every measure is applicable to existing single-family homes during regular equipment replacement cycles, with several measures providing additional electricity savings.
- » Most measures have a clear path to whitepaper development and submission to the MEMD.

Measure Name	Example Project Savings (MCF/yr.)	Incremental Costs (\$)	MEMD	Whitepaper	Performance History
ENERGY STAR Clothes Dryer	0.6	\$50	Revision to Current MEMD Whitepaper	Yes – CA	No
Boiler Reset Controls	7	\$600	Yes to Review Current MEMD Whitepaper	Yes – IL, MN, WI	Yes
Efficient Fan Controller	8	\$161	No	Yes – CA	No
Cold Water Default Clothes Washer	0.7	\$32	No	Yes – CA	Yes
Air-to-Air Heat Recovery	8	\$800	No	Yes – MA, MN	No
Condensing Pool Heater	5	\$3,000	No	No	No

* Note – MCF savings for individual measures are not additive

For each of the six selected gas measures, Navigant developed a four-slide profile that provides a summary of key information such as a technology description, energy and cost savings estimates, market and technology status, and incentive and marketing approach.

MEASURE PROFILE COMPONENTS

1. Measure description and diagram
2. Summary of technical, market, economic, and program information
3. Market participation forecasts
4. Incentive level forecast

Measure	Recommendation
ENERGY STAR Clothes Dryer	Develop Whitepaper
Boiler Reset Controls	Develop Whitepaper
Efficient Fan Controller	Consider Whitepaper
Cold Water Default Clothes Washer	Consider Whitepaper
Air-to-Air Heat Recovery	Consider Whitepaper
Condensing Pool Heater	Remove

Navigant developed new whitepapers or updated the existing whitepaper for these measures.

Residential clothes dryers meeting the recent ENERGY STAR specification use at least 20% less energy than the conventional models.

- » ENERGY STAR clothes dryers incorporate innovative energy saving technologies, such as advanced moisture sensors that shuts off the dryer when clothes are dry.
- » ENERGY STAR criteria requires that the combined energy factor (CEF) of vented gas clothes dryer be greater than or equal to 3.48 lbs/kWh at maximum cycle time of 80 mins, which provides 20% gas savings over conventional models.
- » A combined incentive with clothes washers could be successful since many consumers purchase clothes washers and dryers as a set.



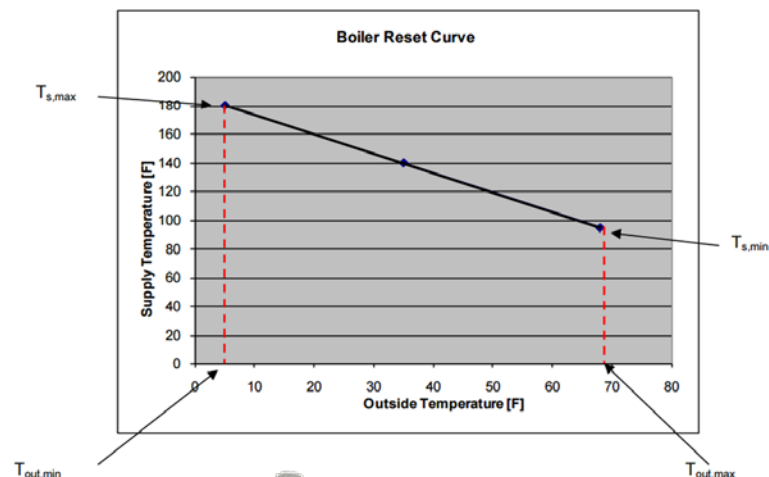
Source: energystar.gov

Measure Name	Gas Savings %	Example Project Savings (MCF/yr.)	Incremental Costs (\$)	Lifetime (Yrs)
ENERGY STAR Clothes Dryer	20%	0.6*	\$50	12

*Note – assumes pairing with standard efficiency clothes washer; if paired with an ENERGY STAR clothes washer, clothes dryer savings would be approximately 0.5 MCF.

Residential boilers with outdoor reset controls reduce temperature settings during moderate weather to reduce natural gas consumption by 5% and greater.

- » Baseline natural gas boilers for residential space heating circulate water at the highest temperature setting (typically 180°F) regardless of outdoor conditions.
- » This practice leads to overly aggressive heating responses during shoulder seasons with moderate temperature conditions, and increases heat losses off the distribution loop.
- » Outdoor reset controls can reduce natural gas consumption by 5% to 15% by varying boiler output proportionally to the outdoor conditions, while still meeting space heating loads.



Source: Honeywell, Building America ([link](#))

Measure Name	Gas Savings %	Example Project Savings (MCF/yr.)	Incremental Costs (\$)	Lifetime (Yrs)
Boiler Reset Controls	5%	7	\$600	15-20 (retrofit)