

HOW MANY MEASURES DOES IT TAKE TO REPLACE A LIGHT BULB?

PORTFOLIO PLANNING POST-EISA

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 - » **Dennis Mullan, Rebecca Malfroid, Kevin Bilyeu, Kevin Stewart, Thelma Dobson.**

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 - » Craig McDonald, Debbie Brannan, **Cherish Smith, Kristin Landry, Emily Merchant, Josh Martens, Na Yu, Emma van Beuningen.**

Bold denotes conference paper co-authors.

EISA 2007

Energy Independence and Security Act of 2007 (EISA) set maximum wattages for general service incandescent lamps for the U.S. starting in 2012.

EISA 2007 also directed the Department of Energy (DOE) to determine in a future rulemaking whether standards for general service lamps should be amended.

2016 Backstop

EISA 2007 set a backstop such that if the DOE rulemaking did not meet certain criteria, sales of general service lamps were prohibited unless they met a minimum efficacy of 45 lumens per watt.

In January 2017, DOE issued a statement that the backstop would go into effect on January 1, 2020.

Post-EISA 2020

The 2020 standards are technology-agnostic and will allow any bulb meeting the minimum 45 lumens per watt standard.

Current incandescent and halogen bulbs do not meet this standard, and manufacturers have already indicated a preference for LEDs over CFLs.

Study Goal: Identify promising emerging technologies for DTE Energy to phase into residential energy efficiency portfolio through 2035 to supplement lost potential savings from LEDs.

Lighting Futures Study



- Estimate achievable potential savings for A-line and reflector LEDs in residential sector for DTE through 2035.

- Determine the “savings gap” defined as the amount of savings LEDs may no longer supply to DTE residential energy efficiency programs following standards and market changes in 2020.

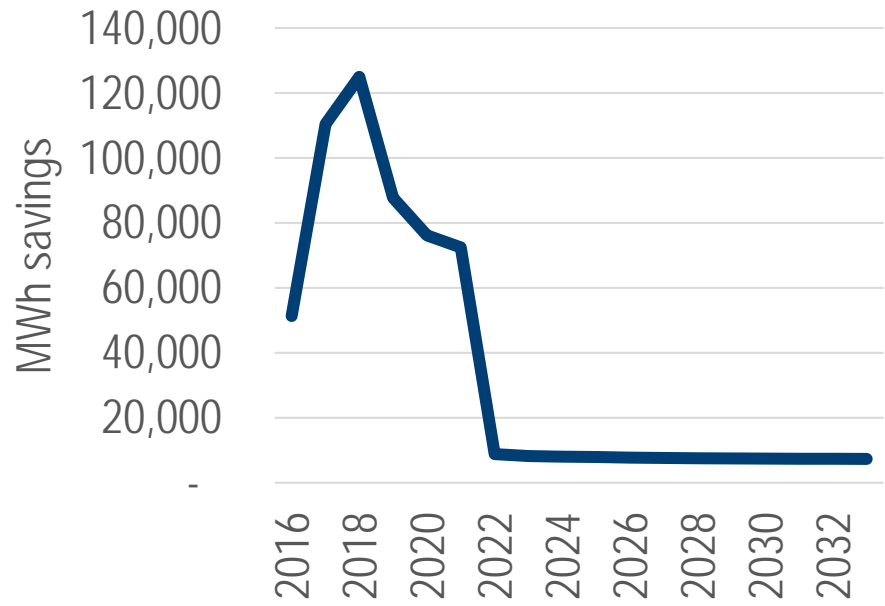
- Conduct a scan of residential electric measures in Michigan Energy Measure Database (MEMD), utility emerging technology programs, R&D organizations, and other resources.

- Assess measures based on market savings potential, market adoption, technology performance, and cost effectiveness.

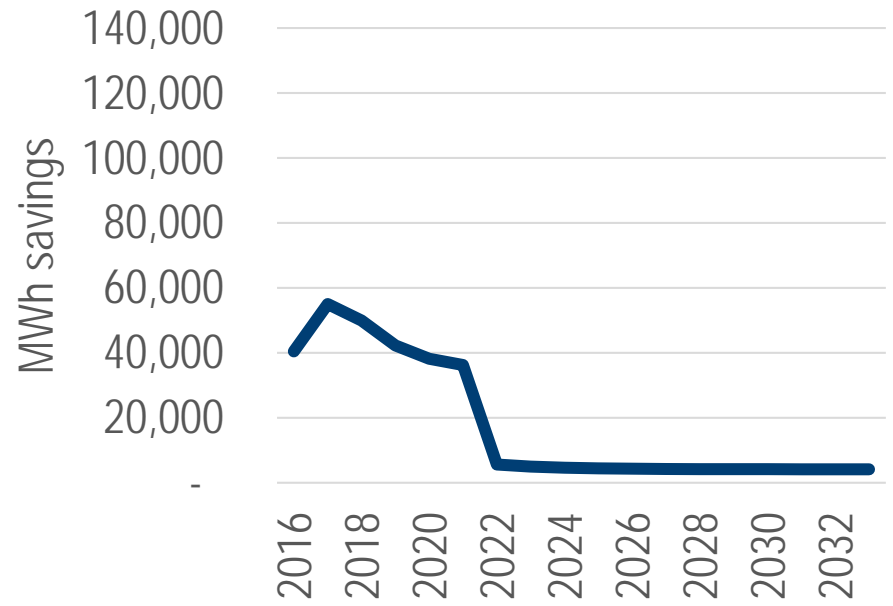
SAVINGS POTENTIAL ANALYSIS

- » The EISA 2020 standards may have a dramatic impact of on claimable energy savings for DTE's residential lighting programs.
- » The most significant impact is the decreased amount of claimable energy savings for each LED bulb, with an average reduction in unit energy savings of 85%.

Savings Potential – A-line Bulbs



Savings Potential – Reflector Bulbs

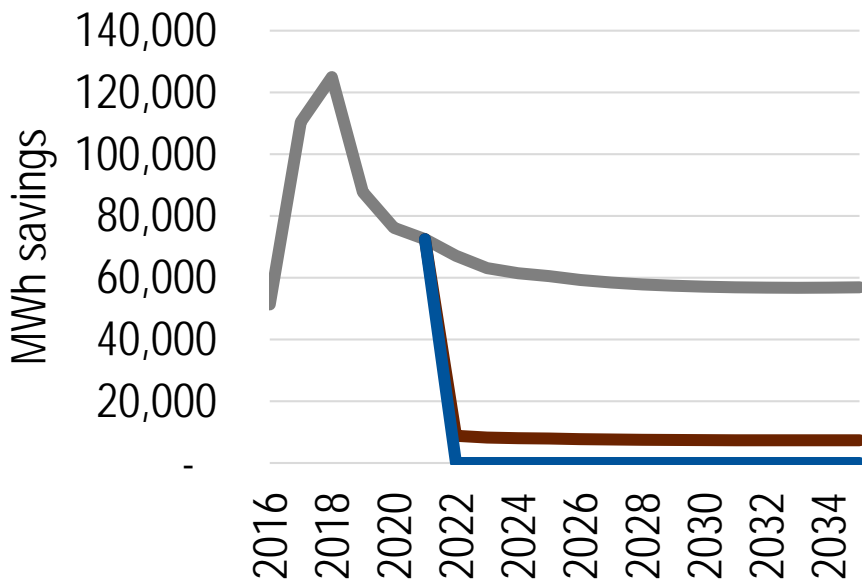


Each forecast was calibrated to the 2018 forecasted savings for DTE's residential LED programs in the 2018-2019 Energy Waste Reduction (EWR) Plan filing and assumes the MEMD baseline change occurs in 2022.

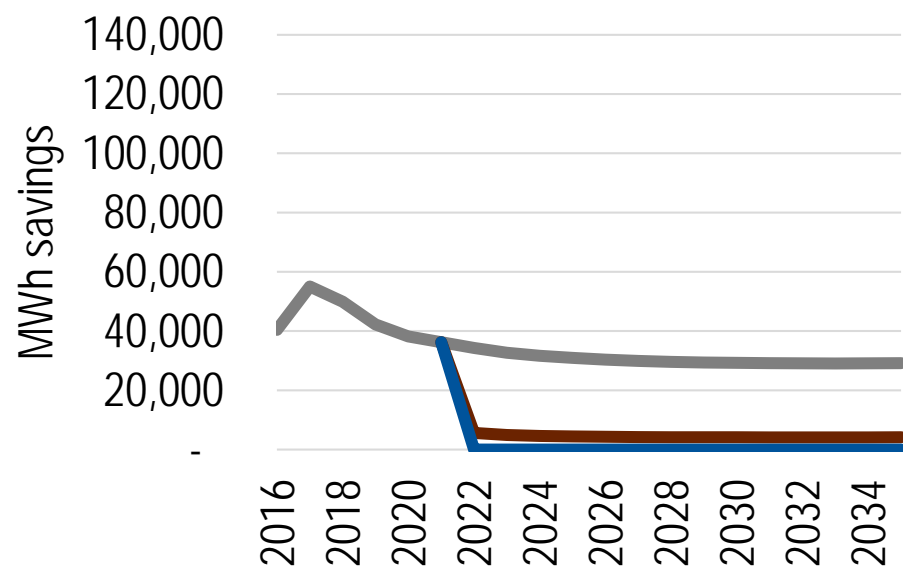
SAVINGS GAP ANALYSIS

- » Navigant forecasted a business-as-usual baseline in which changes to federal standards were not considered (**Gray**) and developed two scenarios to estimate the savings gap:
 - » Scenario 1 assumes LED programs continue at the level forecasted for 2018 (**Red**)
 - » Scenario 2 assumes LED programs cease to be cost effective (due to the changing baseline) and are discontinued (**Blue**).
- » The total potential savings gap in the DTE residential electric portfolio due to changing LED lighting standards and market characteristics is 79.1 - 91.5 GWh in 2025.

Savings Potential – A-line Bulbs



Savings Potential – Reflector Bulbs



Measure Scan

Navigant conducted a measure scan of state Technical Reference Manuals (TRMs), utility programs, and R&D initiatives to identify measures that could provide significant electric savings and were not in DTE's portfolio.

The team developed a list of 32 measures DTE could consider for future residential programs, including:

- 20 existing measures available today from other utility programs
- 12 emerging measures with limited performance history and market availability currently.

Characterization

For each measure, the study team assessed the following:

- Market savings potential
- Cost effectiveness
- Technical information
- Market adoption
- Ease of integration with current programs
- Proposed implementation strategy.

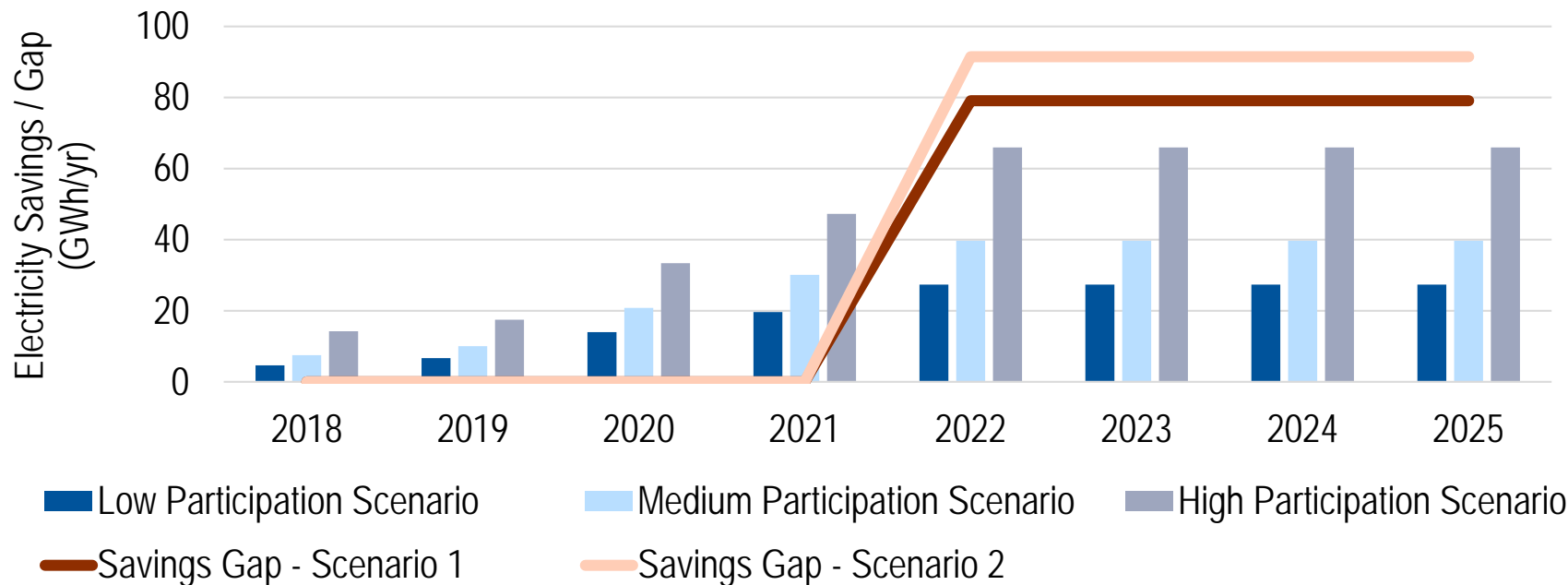
Technology Category	Example Technologies	
Underutilized Measures	<ul style="list-style-type: none"> ENERGY STAR freezers, TVs, displays, water coolers, pool pumps Packaged terminal air conditioners or heat pump units (PTAC/PTHP) 	<ul style="list-style-type: none"> Circulator pumps Low-e storm windows Aerosol envelope sealing
Underserved Markets	<ul style="list-style-type: none"> Ductless mini-split heat pumps Cold climate heat pump 	<ul style="list-style-type: none"> CO₂ heat pump water heaters
Control Measures	<ul style="list-style-type: none"> Shower behavioral measures Hot water recirculation controls Connected water heater controllers 	<ul style="list-style-type: none"> Smart zone air balancing Window air conditioner smart thermostats
Long-Term Technologies	<ul style="list-style-type: none"> Connected lighting systems Air-source integrated heat pumps 	<ul style="list-style-type: none"> Smart residential outlets device management

Bold denotes emerging technology in end-use sector and/or region.

MEASURE INTRODUCTION TIMELINE AND PARTICIPATION SCENARIOS

- » DTE has a promising set of residential electric measures to counteract the lighting savings gap in 5 to 10 years, but challenges exist with meeting the gap.
- » Under each participation scenario, DTE would not complete the savings gap in 2022 without increased participation in existing residential programs.

New Measure Savings Timeline – Low, Medium, High Participation Scenarios



Note: Navigant assumed savings are additive for all measures, which may not apply to all measures within an equipment category or end-use (e.g., installing low-flow showerhead after upgrading water heater).

- The potential savings gap in the DTE residential electric portfolio due to changing LED lighting standards and market characteristics is 79.1 - 91.5 GWh in 2025.
- DTE has a promising set of over 30 residential electric measures to make up a portion of the lighting savings gap over the next 5 to 10 years, but DTE will need to increase savings from other residential programs to meet the gap.
- DTE should use a combination of introducing these new measures and increasing participation of existing programs to fill the savings gap in 2022.
- DTE should begin developing programs for the existing measures in the Michigan Energy Measures Database (MEMD), explore opportunities to increase savings from existing programs, and explore emerging measures with limited performance history.

- » We should continue to watch and monitor developments as to how EISA 2020 is going to be rolled out and when it will impact utility portfolios.
- » The impact of EISA 2020 standards will likely increase cost of running future EE programs (most cost effective measure going away - low hanging fruit). This will impact customer affordability and EE resource attractiveness in generation planning.
 - » Unless lighting measures are replaced with alternative measures of equivalent measure life, we will likely see a reduction in overall portfolio measure life, weighted average portfolio lifetime savings, and avoided cost benefit from EE programs.
- » Utilities should begin taking steps to supplement savings in the residential electric savings gap from EISA 2020, including:
 - » Analyzing the impacts to the overall portfolio savings and cost effectiveness
 - » Introducing new programs and market-ready measures
 - » Conducting pilots with available technologies
 - » Planning for longer term technology and market trends.

INPUT

PROCESS

OUTPUT



Thank you for your attention!



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