



# CALCULATING LIFETIME SAVINGS FOR LEDs

MICHIGAN COLLABORATIVE MEETING

July 17, 2018



Chris Neme, Energy Futures Group (for NRDC)

# Lifetime Savings Calcs are Important

2

- Savings life affects economic benefits/value
- Utility EWR incentives tied to lifetime savings

# Lifetime Savings Calculations

3

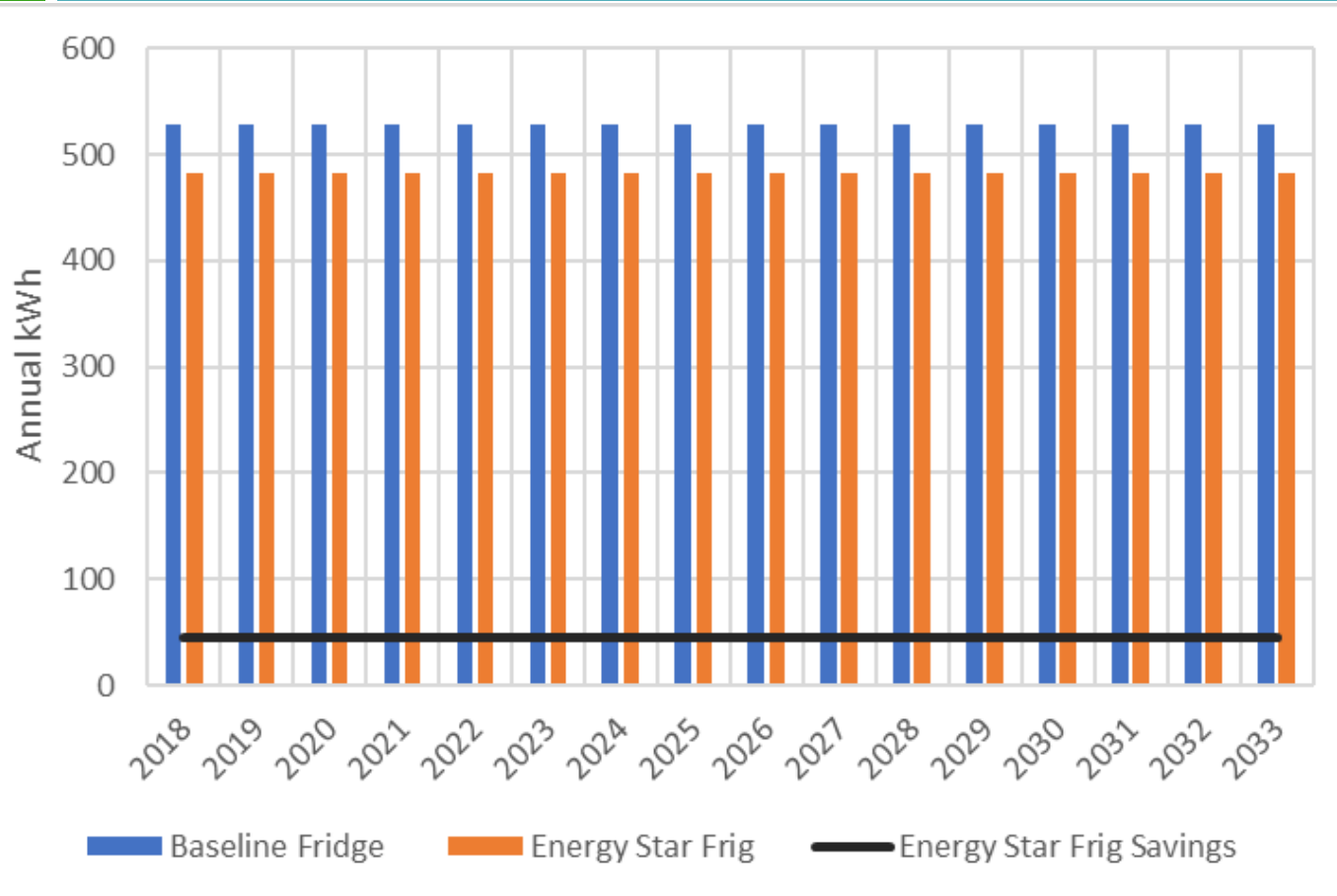
## □ For most measures:

- lifetime kWh = 1<sup>st</sup> year kWh x measure life
- because baseline & efficient equipment have same life

## □ Not the case for residential LED light bulbs

- LEDs may technically/physically last 15 years (MEMD)
- But halogens they displace today last only 1-3 years
  - 5-15 baseline product replacements over life of each LED
  - LED 1<sup>st</sup> year kWh savings repeated every year only if all 5-15 baseline replacements can be assumed to be halogens
  - EISA bans halogens starting in 2020 (for most bulb types)

# Refrigerator Lifetime Savings



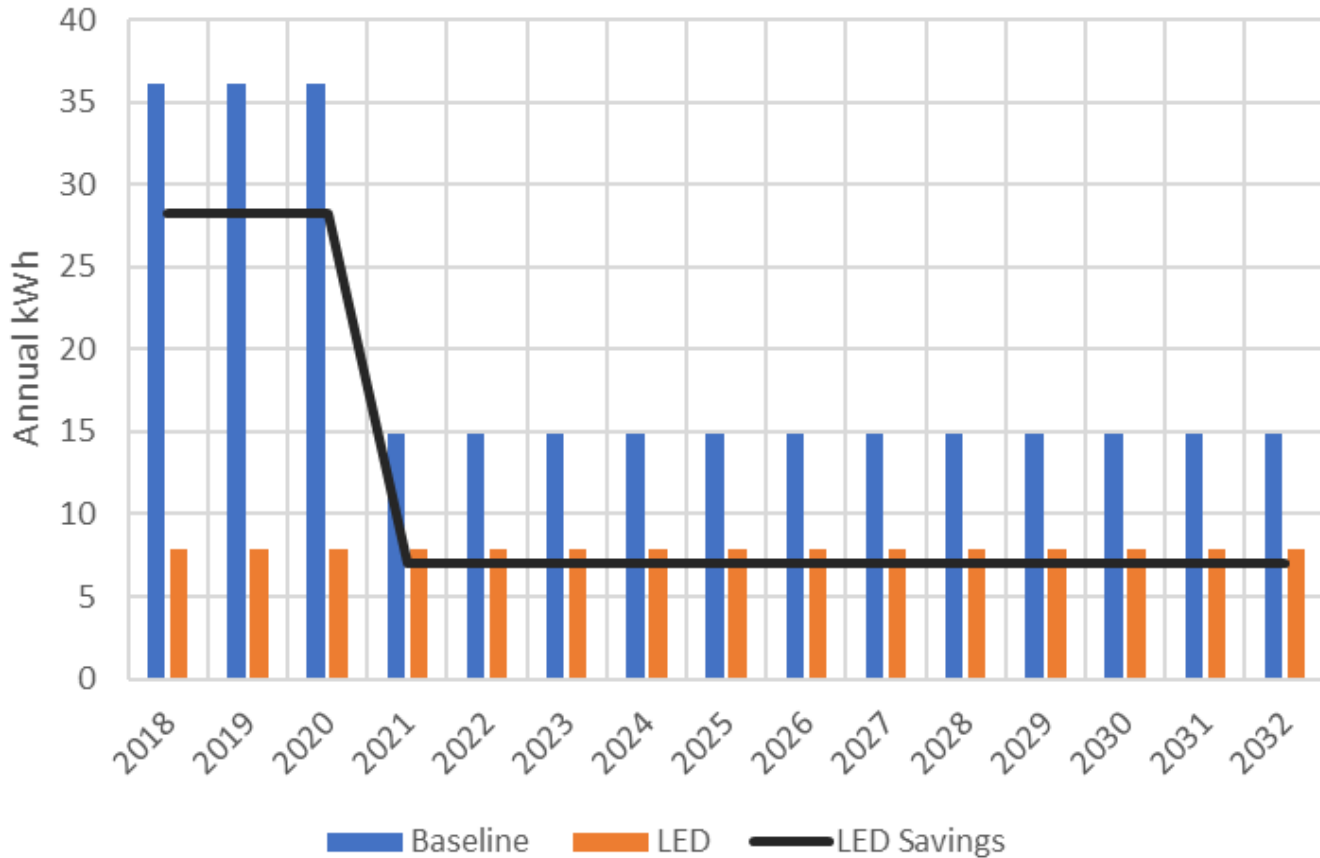
Measure life for standard frig same as for Energy Star frig

45 first year kWh  
 x 16 years  
 = **720 lifetime kWh**

*Savings from Energy Star website for 21 ft<sup>3</sup> fridge with top-mount freezer*

# LED Lifetime Savings

5



Baseline light bulb replaced every 2 years, or 7 times during LED life. Second replacement in 2021 has to be EISA efficiency compliant

$$\begin{aligned}
 & (28 \text{ first year kWh} \times 3 \text{ yrs full savings}) \\
 & + \\
 & (7 \text{ first year kWh} \times 12 \text{ yrs reduced savings}) \\
 & =
 \end{aligned}$$

**169 lifetime kWh**

*Savings from 60W equivalent LED purchased in 2018, assuming MEMD 840 hrs/year, average halogen life of 2 years (i.e. baseline replacement every odd year)*

# Recommendation

6

- Account for savings baseline shift in MEMD
  - ▣ Current MEMD:  $28 \text{ kWh} \times 15 \text{ years} = 420 \text{ kWh}$
  - ▣ Should be  $\sim 60\%$  less for 2018 install (169 kWh)
  - ▣ Arguably even lower for 2019 installs
- Consistent w/U.S. DOE Uniform Methods Project
- Adopted several years ago in IL TRM

7

## Q&A

Chris Neme

Energy Futures Group

[cneme@energyfuturesgroup.com](mailto:cneme@energyfuturesgroup.com)

Phone: 802-482-5001

Cell: 802-363-6551



# Baseline Halogens Last 1-3 Years

8



Philips “75-Watt Equivalent”  
A19 Halogen Long-Life Bulb”  
*Life: 2.3 years (at 2.3 hrs/day)*



Philips “65-Watt Equivalent BR30  
Halogen Dimmable Flood”  
*Life: 2.6 Years (at 2.3 hours/day)*



EcoSmart “60-Watt Equivalent  
A19 Halogen Soft White Bulb”  
*Life: 1.2 Years (at 3 hours/day)*

*2018 Michigan MEMD estimates LED savings assuming 840 hours/year, or 2.3 hours/day.*



# U.S. DOE Uniform Methods Project

9

*“Bulbs expected to be in use in 2020 and beyond will be affected by the EISA backstop provision mentioned in Section 1. The life cycle savings of CFLs, therefore, should either terminate for any remaining years in the expected life beginning in mid-2020, or be substantially reduced after 2020 to account for the backstop provision. Similarly, the life cycle savings for LEDs should incorporate this upcoming baseline change.”*

Dimetrosky, Scott, Katie Parkinson and Noah Lieb, “Chapter 21: Residential Lighting Evaluation Protocol”, The Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures, published by the National Renewable Energy Laboratory, February 2015.

<http://energy.gov/sites/prod/files/2015/02/f19/UMPCChapter21-residential-lighting-evaluation-protocol.pdf>.

# IL TRM

10

## Mid Life Baseline Adjustment

During the lifetime of a standard Omnidirectional LED, the baseline incandescent/halogen bulb would need to be replaced multiple times. Since the baseline bulb changes over time (except for <300 and 2600+ lumen lamps) the annual savings claim must be reduced within the life of the measure to account for this baseline shift.

For example, for 60W equivalent bulbs installed in 2018, the full savings (as calculated above in the Algorithm) should be claimed for the first three years, but a reduced annual savings (calculated energy savings above multiplied by the adjustment factor in the table below) claimed for the remainder of the measure life.

Minimum Lumens	Maximum Lumens	LED Wattage (WattsEE)	Delta Watts 2014-2019 (WattsEE)	Delta Watts Post 2020 (WattsEE)	Mid Life adjustment (made from 01/2021) to first year savings
1490	2600	26.0	46.0	19.5	42.3%
1050	1489	16.1	36.9	12.1	32.8%
750	1049	11.4	31.6	8.6	27.1%
310	749	6.7	22.3	5.0	22.6%