

MEMORANDUM

To: Massachusetts Program Administrators (PAs) and Energy Efficiency Advisory Council (EEAC) Consultants

From: Chris Russell, Lisa Wilson-Wright, and David Barclay NMR

Date: April 24, 2018

Re: 17-6 Market Adoption Model Findings

The 2017 Market Adoption Models (MAM) effort encompassed four main objectives:

- Update 2016 Annual Report General Service Lamp MAM
- Update 2016 Reflector MAM
- Develop a specialty-specific MAM
- Estimate delta watts for each separate MAM

The three models – general service (*i.e.*, standard or A-line), reflector, and specialty – assumed a single scenario (based on the weighted prediction of the PAs, EEAC Consultants and evaluator) of future market trends. This stands in contrast to the 2016 MAM and the 2016 to 2018 Planning MAM, which included multiple scenarios of future market share. The results produced gross and net delta watts for the upstream program and delta watts for the direct install programs for general service, reflector, and specialty LEDs. The PAs use the delta watts to determine annual and lifetime savings for the 2017 program and for planning for the 2019 to 2021 program cycle.

Methods

To accomplish these goals, the evaluation team worked with the PAs and EEAC consultants to predict light-emitting diode (LED), compact fluorescent lamp (CFL), halogen, and incandescent **market share** in the absence of the program from 2017 through 2025 for general service, reflector, and specialty (mostly candelabra and globe) bulbs. NMR provided the PAs and EEAC consultants with various estimates of recent and future market share as well as market information obtained through primary and secondary research. Data sources included program suppliers (manufacturers and retailers), bulb shipment data, bulb sales data, consumer panel data, and on-site saturation panel data. Market information came from program suppliers, ENERGY STAR® partners, news articles, blog posts by industry leaders (e.g., NEMA, ACEEE), and reviews of recent rulemakings and lawsuit settlements stemming from the Energy Independence and Security Act (EISA).

Through an iterative process, the evaluation team presented evaluation information (which became available over time, rather than at a single point in time). Using these data, as well as expertise and knowledge, the PAs, EEAC, and NMR each made predictions about future

market share and met via webinar to discuss their predictions and the reasons behind them. They then had two additional opportunities to update their predictions based on the most recent evaluation findings and market information.

NMR also used program data and internet-based research **to update the crosswalk between wattage and lumen bins**. Although the lighting market and legislation have moved in the direction of lumens (a measure of light output), bulb wattages still determine energy savings. Therefore, NMR reviewed the lumens and wattages of bulbs sold through the program and linked them as closely as possible to the equivalent CFLs, halogen, and incandescent bulbs. Finally, NMR used 2017 program data to develop sales weights for LEDs by these wattage bins.

MAM Wattage Categories

The MAMs utilized multiple wattage categories within each model. NMR assigned a single wattage value per bulb type, representing the most common wattage linking bulbs of similar lumen. We included the lowest wattage bulbs in the specialty MAM but not the general service or reflector MAMs. NMR also developed sales weights for each wattage category based on 2017 program sales. Table 1 lists the wattage categories and sales weights.

Table 1: MAM Wattage Categories and Sales Weights

LED	CFL	Halogen	Incandescent	Sales Weight
General Service MAM				
6	9	29	40	0.17
9	13	43	60	0.78
10	18	53	75	0.04
11	23	72	100	0.01
Reflector MAM				
4	7	39	39	0.66
6	9	51	60	0.33
10	14	43	75	0.01
Specialty MAM				
5	11	20	45	0.06
10	15	55	65	0.86
13	19	56	125	0.08

Model Output

The models calculate gross and net delta watts for the upstream program and delta watts for the direct install programs. For upstream, gross delta watts excludes baseline LED sales, while net delta watts includes them. This distinction does not apply to the direct install programs because they only switch out inefficient bulbs. Table 2 presents the delta watts produced by the general service, reflector, and specialty MAMs.

Table 2: MAM Delta Watts

Year	General Service			Reflector			Specialty		
	LED Gross	LED Net	LED DI	LED Gross	LED Net	LED DI	LED Gross	LED Net	LED DI
2017	32	22	38	45	33	52	36	27	40
2018	33	21	38	46	32	52	36	26	40
2019	33	19	38	46	30	52	37	25	40
2020	34	18	38	46	29	52	38	24	40
2021	34	17	38	47	27	51	38	23	40
2022	34	15	37	47	25	51	39	22	40
2023	34	13	37	47	23	51	39	20	40
2024	34	11	37	47	21	51	39	18	40
2025	35	9	37	47	18	51	40	16	40