



## MEMORANDUM

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

**From:** Monica Nevius, Michael Strom, David Barclay, Lisa Wilson-Wright, Kailey Pratt, NMR Group

**Date:** March 30, 2017

**Re:** RLPNC: 16-11 Task 4b Market Progress Assessment

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### Section 1 Introduction

This Market Progress Assessment summarizes current and historical values for key indicators of progress toward market transformation in the Massachusetts residential lighting market. The indicators are based on outcomes expected to accrue in the market over time as a result of Massachusetts Residential ENERGY STAR® Lighting Program activities. This document is the first deliverable for Phase 2 of the Massachusetts Lighting Logic Model and Market Scan (Study RLPNC 16-11).

Phase 1 of the study resulted in a logic model for the program. The logic model is a graphical representation of the causal links between the program's activities, short-term responses to those activities in the market, and longer-term market effects. The market progress assessment is meant to be a go-to document for referencing past and current market and program information, eliminating the need to scan multiple documents to find all the information needed for regulatory filings, planning, or other purposes. Together with the logic model, it should serve as a clear, concise, easy-to-communicate story about progress toward transformation of the Massachusetts lighting market to high efficiency lighting, and the role of the program in this progress.

For this study, NMR conducted a detailed review of past Massachusetts lighting studies in order to identify appropriate indicators of progress toward the outcomes in the logic model and extracted historical values. In the process, we identified outcomes for which no indicators are being tracked, or for which additional or improved indicators may be helpful, and developed recommendations for tracking these in future. Figure 1 at the conclusion of this memo displays the outcomes from the finalized logic model with their related indicators. The sections preceding this figure explain the various indicators and their priority level, along with NMR's recommendations for continued tracking.

## Section 2 Summary of Findings

### 2.1 HIGH PRIORITY INDICATORS

Table 1 displays historical and current values for the high priority indicators and their related outcomes. The outcomes themselves are shown in Table 4. We recommend continued tracking of all high priority indicators, ideally on an annual basis to the extent that evaluation budgets allow.

In this and subsequent tables, the first column designates the indicator, the second column uses the letters from Table 4 to designate the corresponding outcome(s) from the logic model, and the third column designates the report from which the historical and current values for that indicator are drawn. These reports are numbered in the Sources section.

The overall trends in Table 1 indicate that the program continues to play an important role in transforming the market and helping MA consumers make the move toward energy-efficient lighting, particularly LEDs. LED penetration (the percentage of homes in MA with at least one LED installed) has increased from 7% in 2012 to 51% in 2016, with LED saturation (the percentage of all sockets filled with LEDs) also showing a substantial increase from 1% to 12% over that same period.<sup>1</sup> Ongoing research also reveals that MA has made greater gains in efficient saturation and penetration compared to areas of the country with little or no residential lighting program activity, further pointing to the continued influence of the MA program.<sup>2,3</sup> Nevertheless, the values also point to the continued necessity of the program to aid in further market transformation. Many of the sockets in MA still contain inefficient incandescent and halogen bulbs. Given that the market is moving toward LEDs as the dominant efficient technology, it is imperative that consumers have high-quality yet still affordable LED options in retail stores. This further points to the necessity of maintaining MA incentives on ENERGY STAR LED models.

Other key metrics of market progress—including satisfaction with LEDs, efficient bulb market share, and number of LEDs sold through the program—followed the same trend of increased progress over the past several years (Table 1).

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<sup>1</sup> Forthcoming on-site research in MA shows even greater gains in efficient saturation and penetration. NMR will update the revised Market Progress Assessment once these numbers and reporting have been approved.

<sup>2</sup> “RLPNC 16-5 Sales Data Analysis Task 1e and Task 2b: Sales and Shipment Data Analysis Memorandum.” Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group December 13, 2016.

<sup>3</sup> “2015-16 Lighting Market Assessment Consumer Survey and On-site Saturation Study.” Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group. August 8, 2016.

Table 1: Current and Historical Values for High Priority Indicators

High Priority Indicators	Related Outcome(s)	Report Information	2008	2009	2010	2011	2012	2013	2014	2015	2016
1 LED Satisfaction	C, H	1, 2,4							84%	81%	92% (onsite) 86% (consumer survey)
2 LED Penetration	E, M	1, 2,4					7%	12%	23%	33%	51%
3 LED Saturation	E, M	1, 2,4		<1%	<1%		1%	2%	3%	6%	12%
4 All Efficient Bulb Saturation	E, M	1, 2, 3, 4		26%	26%		28%	30%	36%	38%	43%
5 Market Share of all efficient bulbs	E, I, M, O	6		17%	14%	15%	17%	16%	22%	Select Channels - 24%, All Channels - 42%	
6 Number of LED Products Sold through the program	E, I, M	Program Records					189,810	926,584	1,754,149		3,043,204
7 Market Level Sales of LEDs (Sales per HH)	O	2					0.6	0.2	0.6	1.2	
8 Program Shipments of LEDs						0.1%	0.3%	0.7%	3.5%	12.6%	

## 2.2 MODERATE PRIORITY INDICATORS

Table 2 displays those indicators that NMR has identified as being moderate priority. We have tracked them in case the PAs believe that they continue to be valuable, and we welcome PA insight on their continued tracking. Any individual indicator can easily be re-categorized as high priority should the PAs desire.

The moderate priority indicators reveal high levels of awareness of (86%) and familiarity with (69%) LEDs. We categorized these indicators as moderate priority because the program has already moved to LEDs as its predominant technology, so continued tracking of awareness and familiarity will be of less importance. Nearly all respondents surveyed (97%) indicated having seen or heard of the ENERGY STAR label. Recent research on the proportion of new energy-efficient bulbs replacing other energy-efficient bulbs also provides encouraging results, with 100% of LEDs being replaced by other energy-efficient bulbs, as well as 86% of CFLs, indicating that there is unlikely to be any backsliding of efficient bulb saturation in MA.<sup>4</sup>

Just one of the medium priority indicators, consumers' willingness to pay for efficient lighting (for outcome F in Table 4, Increased consumer willingness to pay more for lighting), is not currently tracked by any Massachusetts study. While NMR does not have a firm recommendation for tracking this indicator, we would be able to do so if the PAs deem it worthwhile. The indicator would ideally be collected during the in-person interview of an on-site visit. The evaluation team is capable of collecting and analyzing such a series of questions should the PAs so desire.

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<sup>4</sup> Note: Indicators 22, 23, and 24 are all derived from shelf-stocking studies. As of this time, the PAs do not have any plans to conduct a shelf stocking evaluation as part of the 2017 research agenda. However, the program implementer may conduct shelf stocking visits in the future which would provide an opportunity to update these indicators.

Table 2: Current and Historical Values for Moderate Priority Indicators

Moderate Priority Indicators	Related Outcome(s)	Report Information	2008	2009	2010	2011	2012	2013	2014	2015	2016
9 Consumer Familiarity with LEDs	A	1,2,4				41%	47%		54%	61%	69%
10 Seen or Heard of ES Label on lighting	A	1									97%
11 Understanding of relative energy use	A	1,4							66% correct for CFLs		60% correct for LEDs, 84% for CFLs
12 LED Awareness	A	1,2,4								79%	86%
13 Rate at which consumers decide which bulb to purchase before shopping	D	5									96% of LED shoppers, 55% of CFL shoppers
14 Percentage of Households with LEDs in storage	E, M	1,2,4					<1%	<1%	2%	2%	4%
15 Percentage of Households Purchasing LEDs in Past Year	E, I, M	1									28% (survey) 43% (onsite)
16 Consumer willingness to pay	F	Not Collected									
17 Rate at which consumers look for ENERGY STAR Label on lighting products	G	1,2,4							3% unprompted, 50% prompted		43%
18 Types of Retail Stores Selling ENERGY STAR-qualified Lighting through the Program	L, N	7									23% hardware, 20% grocery, 17% mass merchant, 10% discount, 13% home improvement, 10% L&E, 7% membership club
19 Proportion of new EE bulbs replacing other EE bulbs	M	1,2,4							81% CFLs replaced with EE bulbs, 50% LEDs replaced with EE Bulbs, 80% EE bulbs replaced with EE bulbs		100% LED's replaced with EE Bulb, 83% CFLs replaced with EE Bulb
20 Total number of LED & CFL Products Sold through the program	E, I, M	Program Records	2,424,894	3,318,081	2,618,856	4,818,883	5,386,128	6,842,703	8,077,050		5,192,318
21 Number of CFL Products Sold through the program	E, I, M	Program Records					5,196,318	5,916,119	6,322,901		2,149,114
22 Percentage of all LED models in stock at retail stores that are ENERGY STAR-qualified	N	7									48%
23 Percentage of products on shelves that are LEDs	N	7, 8, 9			2%		5%	8%			31%
24 Percentage of shelf space devoted to LED products											5% Endcap, 16% Lower Shelf, 39% Middle Shelf, 36% Upper Shelf
25 CFL Penetration	E, M	1, 2						96%	0.96	0.96	96%
26 CFL Saturation	E, M	1, 2		0.26	26%		27%	28%	0.33	0.32	31%

### 2.3 LOW PRIORITY INDICATORS

The team identified two indicators of low priority for the PAs moving forward, neither of which is currently tracked. These are the likelihood of recommending ENERGY STAR bulbs to a friend and satisfaction ratings on direct-install bulbs. Likelihood of recommending ENERGY STAR bulbs to a friend has been measured for MA in the past through add-on samples to the CEE ENERGY STAR Survey, but the PAs stopped supporting the survey in 2013. Table 3 provides a placeholder for these values as the team awaits the relevant reporting from the PAs. NMR does not recommend tracking these indicators moving forward.

**Table 3: Current and Historical Values for Low Priority Indicators**

Lower Priority Indicators	Related Outcome(s)	Report Information	2008	2009	2010	2011	2012	2013	2014	2015	2016
27 Likelihood of recommending ENERGY STAR Lighting to friend	J										
28 Satisfaction ratings on direct install bulbs	K										

### 2.4 OUTCOMES AND LOGIC MODEL

Table 4 shows the 15 outcomes in the logic model, each assigned with a corresponding letter. As Table 1, Table 2, and Table 3 show, the PAs have been tracking data for most of these indicators for about eight years. NMR gathered current and historical values not only for the eight high priority indicators, but also for the 20 indicators categorized as moderate and low priority. These categorizations reflect our assessment of the importance of each indicator for current and future tracking, but, as part of their review of this memo, the PAs and EEAC consultants should verify the accuracy of our categorization. We have included moderate and low priority indicators in order to provide historical values which may be important for understanding how the market has progressed. For moderate priority indicators, NMR welcomes the PAs’ feedback on which indicators they feel are or are not worthwhile for future tracking. NMR does not recommend continued tracking of the low priority indicators because they have a lower value proposition for evaluating the program’s impact.

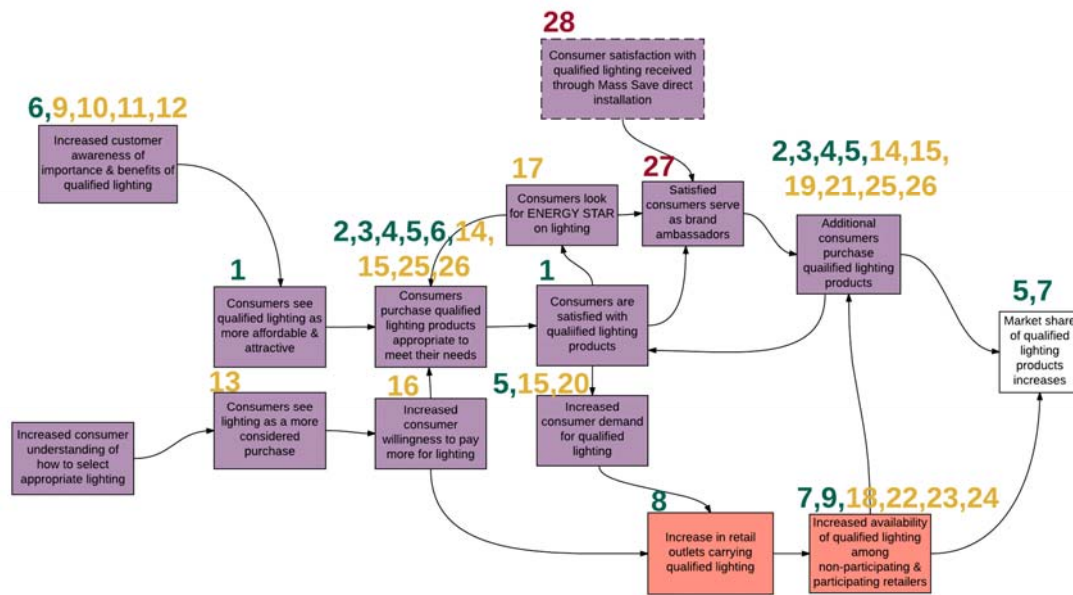
**Table 4: Outcomes from MA Logic Model**

Short-Term Outcomes	
A	Increased customer awareness of importance & benefits of qualified lighting
B	Increased customer understanding of how to select appropriate lighting
C	Consumers see qualified lighting as more affordable and attractive
D	Consumers see lighting as a more considered purchase
Intermediate and Long-Term Outcomes	
E	Consumers purchase qualified lighting products appropriate to meet their needs
F	Increased consumer willingness to pay more for lighting
G	Consumers look for ENERGY STAR on lighting

Short-Term Outcomes	
H	Consumers are satisfied with qualified lighting products
I	Increased consumer demand for qualified lighting
J	Satisfied consumers serve as brand ambassadors
K	Consumer satisfaction with qualified lighting received through Mass Save direct installation
L	Increase in retail outlets carrying qualified lighting
M	Additional consumers purchase qualified lighting products
N	Increased availability of qualified lighting among non-participating & participating retailers
O	Market Share of qualified lighting products increases

Figure 1 displays the outcomes from the finalized MA logic model, with the numbered indicators placed above their related outcomes. The color coding matches the priority levels cited above, with green numbering relegated to the high priority indicators, yellow to moderate, and red to low. As discussions with the PAs progress regarding which indicators they feel are necessary for continued tracking, NMR will update this figure into finalized priority levels.

**Figure 1: Final Logic Model with Outcomes and Related Indicators**



### Section 3 Sources

1. "2015-16 Lighting Market Assessment Consumer Survey and On-site Saturation Study." Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group. August 8, 2016.

2. "Lighting Market Assessment and Saturation Stagnation Overall Report." Prepared for the Electric and Gas Program Administrators of Massachusetts by Cadmus Group. August, 2015.
3. "Market Progress and Evaluation Report (MPER) For the 2007 Massachusetts ENERGY STAR® Lighting Program Final. Volume 1 Findings and Analysis." Prepared for the Electric and Gas Program Administrators of Massachusetts by Nexus Market Research, Inc., RLW Analytics, Inc., Dorothy Conant. July 1, 2008.
4. "Massachusetts Spring 2014 Survey Results: FINAL Report." Prepared for the Electric and Gas Program Administrators of Massachusetts by Cadmus Group. January, 2015.
5. "RLPNC 16-3 Lighting Decision-Making Memorandum." Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group February 17, 2017.
6. "RLPNC 16-5 Sales Data Analysis Task 1e and Task 2b: Sales and Shipment Data Analysis Memorandum." Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group December 13, 2016.
7. "RLPNC 16-6 Lighting Shelf-Stocking." Prepared for the Electric and Gas Program Administrators of Massachusetts by NMR Group - Forthcoming.
8. "Residential Lighting Shelf Survey and Pricing Analysis Final Report." Prepared for the Electric and Gas Program Administrators of Massachusetts by Cadmus Group. June 2, 2014.
9. "Residential Lighting Shelf Survey and Pricing Analysis Final Report." Prepared for the Electric and Gas Program Administrators of Massachusetts by Cadmus Group. June 8, 2013.
10. "Residential Lighting Shelf Survey, Pricing Analysis, and Conjoint Results Final Report." Prepared for the Electric and Gas Program Administrators of Massachusetts by Cadmus Group. April 15, 2011.