

Massachusetts C&I Evaluation Contract Project Summary: Impact Evaluation of PY2016 Massachusetts C&I Small Business Initiative – Phase I (Lighting)

Project Timeframe: Aug 2017 – Apr 2018
Research Area: Impact Evaluation

High-level Study Objective: To quantify the electric energy savings and demand reduction from the Massachusetts C&I Small Business Initiative's lighting fixture and controls measures.

The ERS and DNV GL evaluation team found that the SB Initiative generates significant electric energy savings through its lighting fixture upgrades and controls measures. We found that the Initiative is reasonably accurate in parameter-specific assumptions on installation rate, delta watts, hours of operation, peak coincidence, and HVAC interactivity, as evidenced by RRs of 95%, 91%, and 103% for electric energy, summer peak demand, and winter peak demand, respectively. Through on-site inventories and metering among a sample of 105 SB facilities upgraded in PY2016, evaluators determined that the Initiative's contractors track the measures comprehensively and clearly. Nonetheless, the evaluation team has identified recommendations and considerations for the Initiative in the rapidly evolving LED market, as outlined in the next sections. With the PAs' transition to a lifetime savings calculation approach imminent in 2019, evaluators assessed the impact of a dual baseline calculation approach to lifetime savings. Evaluators estimate that a dual baseline approach will reduce lifetime savings by 15% as compared with the traditional lifetime savings from an early replacement baseline approach; however, this estimate should be refined with LED market research from the ongoing P75 study once available.

PA application of results

For retrospective application of results (PY2018), the PAs should apply the results in the table below to **reported** savings.

Savings Parameter	Retrospective Recommended Value	Relative Precision at Specified Confidence Interval
Gross Energy (kWh) Retrospective RR	95.1%	±4.7% (90% confidence)
Gross Summer Peak Demand Retrospective RR	90.6%	±2.5% (80% confidence)
Gross Winter Peak Demand Retrospective RR	102.8%	±11.8% (80% confidence)

For prospective application of results (PY2019 and beyond), the full report provides two options for the PAs: 1) wholesale application of prospective RRs to **tracking** savings, or 2) application of individual savings factors within the PAs' tracking databases. The full report's Section 1.5.2 contains equations with the following parameters for recommended application.

Savings Factor	Formula Term	Prospective Recommended Value	Relative Precision at Specified Confidence Interval
Connected kW RR	$RR_{Conn\ kW}$	97.2%	±1.4% (80% confidence)
HOU RR	RR_{HOU}	98.4%	±3.9% (90% confidence)
kWh HVAC Interactive Factor	$HVAC\ Interactivity_{kWh}$	102.4%	±6.3% (90% confidence)
Summer CF	CF_{Summer}	57.0%	±14.1% (80% confidence)
Winter CF	CF_{Winter}	57.9%	±8.3% (80% confidence)
Summer kW HVAC Interactive Factor	$HVAC\ Interactivity_{skw}$	108.4%	±1.7% (80% confidence)
Winter kW HVAC Interactive Factor	$HVAC\ Interactivity_{wkw}$	99.4%	±0.8% (80% confidence)

Initiative process recommendation

Standardized TLED wattages. The PAs should work with vendors to standardize how savings from tube LEDs (TLEDs), in particular "plug and play" TLED retrofits of fluorescent fixtures, are classified and tracked. As TLEDs were emerging when the 2013-15 MA TRM was completed, its standard fixture wattage table does not address TLEDs; therefore, evaluators found variation among vendors in how TLED fixture wattage was estimated. Many such TLED projects were classified as "custom" simply because no appropriate measure code was available in prescriptive templates. Evaluators often found differences between the vendor's fixture wattage assumption and that determined from DesignLights Consortium (DLC) reference and/or independent review of the manufacturer's specification sheets, particularly for "plug and play" TLED retrofits that reuse the pre-existing fluorescent ballasts. The PAs should provide more comprehensive guidance to vendors on when to classify fixtures as prescriptive or custom, how to estimate custom fixture wattages appropriately (e.g., through DLC reference), and which supporting documentation should be included in the application.

For full report see: Impact Evaluation of PY2016 MA C&I Small Business Initiative Phase I Final Report on the EEAC website, <http://ma-eeac.org/studies/>

Impact Evaluation of PY2016 Massachusetts Commercial and Industrial Small Business Initiative – Phase I (Lighting) – Report Summary (cont.)

Comprehensive findings and recommendations matrix

Recommendations		
PA application of results	Recommendation 1	For retrospective application of results (PY2018), we recommend that the PAs apply the results in the first table on the previous page.
	Recommendation 2	For prospective application of results (PY2019 and beyond), we recommend that the PAs adopt one of two options: 1) wholesale application of prospective RRs to tracking savings, or 2) replace tracking system factors with the evaluated system factors listed in the second table on the previous page.
Initiative process recommendations	Recommendation 3	The PAs should work with vendors to standardize how savings from tube LEDs (TLEDs), in particular “plug and play” TLED retrofits of fluorescent fixtures, are classified and tracked. As TLEDs were emerging when the 2013-15 MA TRM was completed, its standard fixture wattage table does not address TLEDs; therefore, evaluators found variation among vendors in how TLED fixture wattage was estimated. The PAs should provide more comprehensive guidance to vendors on when to classify fixtures as prescriptive or custom, how to estimate custom fixture wattages appropriately (e.g., through DLC reference), and which supporting documentation should be included in the application.
Future research	Recommendation 4	In 2019, Massachusetts will transition to a lifetime savings calculation and subsequent dual baseline approach. This study estimated the impacts of such a transition to lifetime savings but referenced a placeholder out-year factor of 60%. The P75 LED Market study will provide more accurate and granular data on the anticipated C&I LED market as compared with existing technologies. Additionally, the P73D study may provide more Massachusetts-specific research on remaining useful life (RUL) for C&I lighting systems. This information should be paired with the granular, fixture-level evaluation data available from this study to refine the lifetime savings impact.
	Recommendation 5	As this study represents only Phase I of the Small Business Initiative impact evaluation, we recommend that Phase II is executed as soon as possible. This study examined performance of lighting measures only (fixtures and controls), but as the penetration of LEDs grows rapidly, the Initiative must look to non-lighting technologies to diversify their measure offerings and compensate for more limited lighting fixture savings in future program years. Phase II should include an assessment of missed non-lighting opportunities among major measure categories such as refrigeration, HVAC, envelope, and DHW.

Findings	Recommendations				
	Recommendation 1	Recommendation 2	Recommendation 3	Recommendation 4	Recommendation 5
The RRs for electric energy, connected kW, and summer peak kW were lower than 100%.	x	x			
The RR for winter peak kW was higher than 100%.		x			
Evaluators found lower levels of HVAC interactive savings than anticipated by the Initiative.		x			
A primary contributor to the RRs was differences in pre- or post-project fixture wattages.	x	x	x		
A dual-baseline approach will reduce SB lifetime savings by 15% but should be refined by P75 data.				x	
LED saturation is growing rapidly, and the Initiative should look to non-lighting measures further.					x