2024 Indiana Commercial & Industrial Portfolio EM&V Report

Volume I of II

Prepared for:

Indiana Michigan Power

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1. Introduction

Under contract with the Indiana Michigan Power (I&M), ADM Associates, Inc., (ADM) performed evaluation, measurement, and verification (EM&V) activities that confirmed the energy savings (kWh) and demand reduction (kW) realized through the energy efficiency programs that I&M implemented in Indiana during the during January 2024 through December 2024 (PY2024).

This chapter provides a summary of evaluation findings for the C&I program portfolio and presents information regarding the organization of the report.

1.1. Summary of Data Collection

Table 1-1 summarizes the number of verification sites reviewed for the ex post gross analysis.

Table 1-1 Number of Sampled Projects

Program	*Number of Sampled Projects*
Work Prescriptive	29
Work Custom	23
Work Direct Install	6
Work Strategic Energy Management	Census

Surveys were conducted to collect data on the program's impact on participants' decisions to install efficient equipment, as well as their feedback on the program. Table 1-2 summarizes the survey data collection completed for PY2024.

Table 1-2 Summary of Survey Data Collection

Survey	*Mode*	*Time Frame*	*Number of Contacts*	*Number of Completions*	*Completion Rate*
Work Prescriptive and Custom Participant Survey	Email and phone follow up	August 2024	143	22	15.4%
	Telephone	January 2025	133	22	16.5%
Work Small Business Direct Install Participant Survey	Email and phone follow up	August 2024	2	1	50.0%
	Telephone	January 2025	8	2	25.0%
Total			286	47	16.4%

1.2. Impact Evaluation Findings

The savings variables presented in this evaluation report are defined in Table 1-3.

Table 1-3 Savings-Related Terminology

Variable	*Definition*
kWh Savings Goal	*kWh Savings Goal* is the energy savings goal cited in the applicable portfolio plan.
Ex Ante Gross kWh Savings	*Ex Ante Gross kWh Savings* are the annual energy savings reported by I&M and are typically obtained from I&M's DSM/EE Program Scorecard documents.
Gross Audited kWh Savings	*Gross Audited kWh Savings* are determined by reviewing tracking data presenting for any errors and adjusting *Ex Ante Gross kWh Savings* accordingly.
Gross Verified kWh Savings	*Gross Verified kWh Savings* are determined by applying an installation rate to the *Gross Audited kWh Savings*.[1] The installation rate is defined as the ratio of units that were installed (verified) to the number of units reported (claimed).
Ex Post Gross kWh Savings	*Ex Post Gross kWh Savings* are the realized annual gross kWh savings reflecting all adjustments made by ADM, without accounting for free ridership or spillover.
Ex Post Net kWh Savings	*Ex Post Net kWh Savings* are equal to *Ex Post Gross kWh Savings*, adjusted to account for free ridership and spillover.[2]
Ex Post Net Lifetime kWh Savings	*Ex Post Net Lifetime kWh Savings* is the *Ex Post Net kWh Savings* occurring over the course of the applicable measure effective useful life (EUL).
Gross Realization Rate	*Gross Realization Rate* is equal to *Ex Post Gross kWh Savings* divided by *Ex Ante Gross kWh Savings*.
Net-to-Gross Ratio	*Net-to-Gross Ratio* is equal to *Ex Post Net kWh Savings* divided by *Ex Post Gross kWh Savings*.
Free Rider[3]	A *free rider* is a program participant who would have implemented the program measure or practice in the absence of the program. Free riders can be: 1) total, in which the participant's activity would have completely replicated the program measure; 2) partial, in which the participant's activity would have partially replicated the program measure; or 3) deferred, in which the participant's activity would have completely replicated the program measure, but at a future time than the program's timeframe. The free ridership estimate are the savings attributable to free riders.

[1] Gross Verified energy impacts will be equal to Gross Audited energy impacts for the Work Prescriptive, Work Custom, and Work Direct Install Programs as the in-service rate for these programs is 1.0.

[2] ADM conducted a non-participant spillover study in 2021 to estimate non-participant spillover and concluded that there was not any qualifying non-participant spillover. Spillover savings presented in this report reflect participant spillover.

[3] Northeast Energy Efficiency Partnerships (NEEP) EMV Glossary version 2.1. https://neep.org/media/4330

Variable	*Definition*
Spillover (Participant and Non-Participant)[4]	*Spillover* effects are reductions in energy consumption and/or demand caused by the presence of an energy efficiency program, beyond the program-related gross savings of the participants and without financial or technical assistance from the program. There can be participant and/or non-participant spillover. *Participant spillover* is the additional energy savings that occur when a program participant independently installs energy efficiency measures or applies energy saving practices after having participated in the efficiency program because of the program's influence. *Non-participant* spillover refers to energy savings that occur when a program non-participant installs energy efficiency measures or applies energy savings practices as a result because of a program's influence.

Based on the definitions presented in Table 1-3, Table 1-4 presents a summary of the components of the impact evaluation that are accounted for in savings variables presented in this report.

Table 1-4 Components of Impact Evaluation Accounted for in Savings Variables

Category	*Tracking Data Review*	*In-Service Rates*	*Ex Post Gross Analysis*	*Net-to-Gross Analysis*
Gross Audited	✓			
Gross Verified	✓	✓		
Ex Post Gross	✓	✓	✓	
Ex Post Net	✓	✓	✓	✓

ADM performed EM&V activities for each of the C&I programs offered by I&M during PY2024. Total C&I portfolio ex post gross energy savings are 59,594,070 kWh, while ex post net energy savings are 58,136,173 kWh, as shown in Table 1-5.

Table 1-5 Summary of Energy Savings – PY2024

Program Name	*Ex Ante Annual kWh Savings*	*Gross Audited kWh Savings*	*Gross Verified kWh Savings*	*Ex Post Annual Gross kWh Savings*	*Gross Realization Rate*	*Ex Post Annual Net kWh Savings*	*Net-to-Gross Ratio*	*Lifetime Net Ex Post kWh Savings*
Work Prescriptive	29,876,578	29,876,578	29,876,578	25,336,704	85%	24,111,397	95%	347,229,002
Work Custom	33,030,210	33,030,210	33,030,210	31,520,408	95%	31,299,462	99%	168,166,789
Work Strategic Energy Management	3,557,229	3,557,229	3,557,229	2,359,017	66%	2,359,017	100%	15,792,759
Work Direct Install	515,245	515,245	515,245	377,941	73%	366,298	97%	5,241,616
C&I Portfolio Totals	66,979,263	66,979,263	66,979,263	59,594,070	89%	58,136,173	98%	536,430,167

Total C&I portfolio ex post gross peak demand savings are 10,232.82 kW, while ex post net peak demand savings are 9,975.86, as shown in Table 1-6.

4 Ibid.

Table 1-6 Summary of Peak Demand Impacts – PY2024

Program Name	*Ex Ante Gross kW Savings*	*Gross Audited kW Savings*	*Gross Verified kW Savings*	*Ex Post Gross kW Savings*	*Gross Realization Rate*	*Ex Post Net kW Savings*	*Net-to-Gross Ratio*
Work Prescriptive	1,858.40	1,858.40	1,858.40	3,924.12	211%	3,702.11	94%
Work Custom	3,313.17	3,313.17	3,313.17	5,962.01	180%	5,927.90	99%
Work Strategic Energy Management	-	-	-	292.27	N/A	292.27	100%
Work Direct Install	4.96	4.96	4.96	54.43	1097%	53.58	98%
C&I Portfolio Totals	5,176.54	5,176.54	5,176.54	10,232.82	198%	9,975.86	97%

1.3. Cost Effectiveness Evaluation Findings

ADM performed the following cost effectiveness tests for the programs: Total Resource Cost (TRC) test, Utility Cost Test, Participant Cost Test (PCT), and Ratepayer Impact Measure (RIM) test. A test score above one signifies that, from the perspective of the test, the program benefits were greater than the program costs. Table 1-7 shows the test results for each program.

Table 1-7 Summary of PY2024 Benefit-Cost Ratios

Program	*Program Administrator Cost Test (aka USCRT, or UCT)*	*Total Resource Cost Test*	*Ratepayer Impact Measure*	*Participant Cost Test*
Work Prescriptive	2.96	2.06	0.45	4.71
Work Custom	1.26	1.06	0.36	3.79
Work Strategic Energy Management	0.93	0.62	0.32	2.56
Work Direct Install	0.48	0.60	0.25	6.82
C&I Portfolio Total	1.91	1.47	0.41	4.23

1.4. Evaluation Findings and Recommendations

1.4.1. Work Custom and Prescriptive

The program is functioning well for participants, with 98% expressing overall satisfaction and similarly high ratings across most aspects. While feedback was largely positive, one participant noted some dissatisfaction with the rebate processing time. Of the 13 customers who engaged with staff, 92% reported being very satisfied with the thoroughness of responses and the time taken to address their questions.

The application process was generally well-received by respondents, with high satisfaction across key aspects, including ease of access, portal usability, and approval timelines. Most respondents knew where to seek assistance, and the majority found the required effort to be

reasonable. However, some respondents suggested improvements, particularly clearer instructions for custom lighting projects and more accessible support for clarifications.

1.4.2. Work Direct Install

Work Direct Install participation increased during PY2024. The number of projects increased by 44% and savings increased 270%.

Participant satisfaction was high. All respondents were very satisfied with staff responsiveness, installed equipment, installation quality, and the overall program. Two-thirds were very satisfied with installation timelines. All respondents were satisfied with how well trade allies explained program rules and processes.

The realization rate varied across sampled projects due to differences in fixture types, wattages, and operating hours compared to prescriptive assumptions. For Sample ID 302, the lower realization rate (43%) was attributed to differences in fixture specifications and reduced operating hours in the industrial area compared to the ex ante assumptions.

For Sample ID 303, exterior canopy light fixtures operated for fewer hours than assumed in the prescriptive savings model, leading to a realization rate of 61%. However, the same sample also showed a 157% realization rate for interior LED tube replacements, as their operating hours were based on store open hours, which exceeded the prescriptive assumptions. For Sample ID 305, the exterior canopy lights also operated for fewer hours than assumed, resulting in a realization rate of 67%. For Sample ID 302, the lower realization rate (43%) was attributed to differences in fixture specifications and reduced operating hours in the industrial area compared to the ex ante assumptions.

- Recommendation 1: ADM recommends verifying hours of operation for external lighting since two sampled sites had lighting that operated from dusk to business close rather than a longer period.

1.4.3. Work Strategic Energy Management

Program savings increased significantly in PY2024. The program saw a nearly 10-fold increase in energy savings in PY2024.

The evaluation findings indicate discrepancies in the treatment of capital project savings, which contributed to differences between ex ante and ex post savings estimates. For Sample ID 401, air leak repair savings were not properly excluded from the ex ante model, leading to an overstatement of savings. The evaluation team corrected this by removing the savings associated with air leak repairs conducted during the reporting period, aligning the ex post estimate with actual implementation timing. For Sample ID 402, while two of the three capital improvement projects were correctly removed from the modeled savings, one project was mistakenly retained, impacting the final savings estimate.

- **Recommendation 1: Perform additional QC of the handling of capital improvement project savings to be excluded from the SEM modeled savings estimates.**

1.5. Organization of Report

ADM prepared two volumes for this report, and they provide information on the impact, process, and cost effectiveness evaluation of the Indiana Michigan Power portfolio of C&I programs implemented in Indiana during the 2024 program year. Volume I is organized as follows:

- Chapter 2: Work Prescriptive
- Chapter 3: Work Custom
- Chapter 4: Work Direct Install
- Chapter 5: Work Midstream
- Chapter 6: Work Strategic Energy Management
- Chapter 7: Cost Effectiveness Evaluation

See report Volume II for chapters that present reports of site-level gross energy impacts, survey instruments and tabulated survey response information.

2. Work Prescriptive

This chapter presents the results of both the impact and process evaluations of the Work Prescriptive Program that Indiana Michigan Power (I&M) offered to its non-residential customers during the period of January 2024 through December 2024.

The objectives of the evaluation were to:

- Complete project pre-approval reviews;
- Assess gross and net energy (kWh) savings and peak demand (kW) reductions resulting from participation in the program during the program year;
- Complete a limited process evaluation of the program; and
- Provide recommendations for program improvement as appropriate.

2.1. Program Description

This program targets non-residential customers eligible for prescriptive measures. These will include commercial, industrial, and institutional customers. For-profit, non-profit, and public agencies (such as schools) will be included.

Customers can either apply for rebates in this program by email or postal mail, or can participate through a trade ally that may apply for the rebate.

Categories of eligible measures for this program include:

- Lighting
- Lighting controls
- HVAC systems
- Variable frequency drives
- Commercial refrigeration equipment
- Commercial kitchen equipment

Work Prescriptive also include a midstream HVAC component.

2.2. Data Collection

2.2.1. Verification of Measures

2.2.1.1. Sampling Plan

ADM selected a sample of all 2024 C&I projects for which ADM performed measurement and verification (M&V) and calculated gross realized kWh savings and kW demand reductions.

ADM used a stratified sampling approach to develop the M&V sample. A stratified sampling approach allowed for a given statistical precision and confidence level target to be met with a

smaller sample size than would have been allowed by simple random sampling. Strata boundaries were based on ex ante kWh energy savings. ADM selected a sample with enough sample units to facilitate estimation of program ex post kWh energy savings with 10% statistical precision at a 90% confidence level.

Completed program projects accumulated over the course of the program year, and sample selection occurred at multiple points in time. The timing of sample selection was contingent upon the timing of the completion of projects during the program year.

The table below shows the number of projects, ex ante gross kWh energy savings, and sampling statistics, by stratum, of the program sample.

Table 2-1 Population Statistics Used for Work Prescriptive Sample Design

Variable	*Stratum 1*	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Totals*
Strata boundaries (kWh)	> 390000	191000 - 390000	83500 - 191000	30000 - 83500	< 30000	
Number of projects	7	34	62	109	292	504
Total Ex Ante Annual kWh	4,624,998	9,046,491	7,685,647	5,477,207	3,042,235	29,876,578
Average kWh Savings	660,714	266,073	123,962	50,250	10,419	1,111,418
Std. dev. of kWh savings	291,718	52,119	29,668	15,170	8,106	396,781
Coefficient of variation	0.44	0.2	0.24	0.3	0.78	
Final design sample	5	3	4	4	8	24

2.2.1.2. Verification Data Collection Procedures

ADM used a combination of on-site visits and remote verifications to collect project-specific data. ADM performed on-site data collection for larger or more complicated projects that required more extensive data collection in the form of visual inspection, monitoring, and/or facility operating schedules and load factors. For less complex projects, data collected remotely was used to estimate savings.

2.2.1.2.1. On-site Data Collection Procedure

The visits to the sites of sampled projects were used to collect primary data on the measures implemented under the program. During an on-site visit, the field staff accomplished three major tasks:

- First, they verified the implementation status of all measures for which customers received incentives. They verified that the energy efficiency measures were installed correctly and still functioned properly.
- Second, they collected the physical data, when necessary, needed to analyze the energy savings that had been realized from the installed improvements and measures. Data was collected using a form that had been prepared specifically for the project in question after an in-house review of the project file.
- Third, they interviewed the contact personnel at a facility to obtain additional information on the installed system to complement the data collected from other sources.

Monitoring was conducted to gather additional information on the operating hours of the installed measures. Monitoring was conducted at sites for which ADM staff members determined that monitored data were necessary to minimize uncertainty associated with savings calculation of energy impacts. Monitoring was not considered necessary for sites for which other data sources and methods would support estimation of energy impacts with relatively less uncertainty.

2.2.1.2.2. Remote Data Collection Procedure

The following bulleted list summarizes the remote data collection procedures ADM followed. For remote data collection, ADM continued to use its practice of a detailed review of project invoicing and supporting documentation. ADM discussed any discrepancies between invoicing and documentation and incentivized measures identified in program tracking data with the customer contact. Additionally, ADM referenced CLEAResult's pre- and post-inspection forms, when available.

- For cases where the information needed was limited to the verification of the installation of the equipment, an ADM analyst contacted the site contact by email, with telephone follow-up as needed, to confirm the installation of the measure. For cases where more detailed information such as operations schedules or heating and cooling type was needed, ADM completed interviews guided by the information needs defined in the site-specific M&V plan. For these cases, a member of the ADM call center contacted the site contact to schedule a time for an interview with the analyst or an engineer, as appropriate. In some cases, ADM also requested site contacts to install monitoring equipment that ADM mailed to them if they had the technical resources available to support that activity and other M&V approaches were not feasible. ADM only took this approach for equipment that involved no safety risks to the customer. Additionally, customers were asked to send pictures of installed equipment such as motor nameplates. The site-specific M&V plan referred to the data collection plan for the site.
- For cases where Option B (retrofit isolation) would be applied, ADM requested energy use data collected through EMS systems or other onsite monitoring efforts implemented by site staff or their contractors, if available. As needed, and if acceptable to the customer, ADM scheduled video conferencing with its experienced engineers and field staff to assist customers with getting this data. As mentioned above, ADM may have mailed and asked customers to install and mail back monitoring equipment where the site staff had the technical resources to support the data collection effort and other M&V approaches were not viable. ADM only took this approach for equipment that involved no safety risks to the customer.
- Application of International Performance Measurement and Verification Protocol (IPMVP) Option C was used for custom measures where feasible, supplemented by information collected by telephone or email on schedule and equipment changes that may have occurred during the pre-and post-installation period.

2.2.2. Participant Survey

ADM administered a survey to Work Prescriptive and Work Custom participants to collect data for use in estimating net savings and obtaining feedback about participants' experience with the program. Table 2-2 summarizes the survey data collection efforts. To increase the response rate, ADM engaged participants through both email and telephone communications.

Table 2-2 Summary of Work Prescriptive and Work Custom Data Collection

Survey	*Mode*	*Time Frame*	*Number of Contacts*	*Number of Completions*	*Completion Rate*
Work Prescriptive and Custom Participant Survey	Email and phone follow up	August 2024	143	22	15.4%
	Telephone	January 2025	133	22	16.5%
Total			276	44	15.9%

2.3. Estimation of Ex Post Gross Savings

2.3.1. Methodology for Estimating Ex Post Gross Savings

2.3.1.1. Review of Documentation

I&M's program implementation contractor provided documentation for the sampled energy efficiency projects undertaken at customer facilities. ADM's first step in the evaluation effort was to review this documentation and other program materials that were relevant to the evaluation effort.

For each sampled project, ADM reviewed the available documentation (e.g., audit reports, savings calculation work papers, etc.) for each rebated measure, with attention given to the calculation procedures and documentation for savings estimates. Reviewed documents included program forms, reports, billing system data, weather data, and any other potentially useful data. For each application, ADM determined if the following types of information was available for each application:

- Documentation for the equipment changed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Documentation for the new equipment installed, including (1) descriptions, (2) schematics, (3) performance data, and (4) other supporting information
- Information about the savings calculation methodology, including (1) what methodology was used, (2) specifications of assumptions and sources for these specifications, and (3) correctness of calculations.

In addition to the above activities, ADM completed a review of program tracking data. The purpose of the review was to assess the sufficiency of the tracking data for supporting program implementation and evaluation. To this end, ADM reviewed the program data to verify tracking

of the following fields, that the fields were populated (i.e., the data were not missing), and that the values were reasonable.

- Unique customer identifier, such as customer account number;
- Customer specific project data such as contact name and information, building type;
- Project milestone dates such as application submission date, application approval, incentive payment (where applicable);
- Measure specific information such as:
  - type of measure;
  - specific measure;
  - ex ante measure kWh energy savings and peak kW reductions;
  - measure attributes necessary to estimate measure savings (where applicable);
  - unique measure identifier (e.g., numeric or alpha-numeric code);
  - unit serial number (where applicable);
  - incremental costs / project costs
- Vendor/Contractor business name, contact name and information (where applicable);
- Incentive amounts; and
- Application status.

ADM provided recommendations, specifically regarding tracking measure level information, to the implementation contractor based on this review.

2.3.1.2. Procedures for Estimating Measure-Level Gross Energy Savings

A breakdown of sampled measures for the Work Prescriptive Program is below in Table 2-3.

Table 2-3 Breakdown of Sampled Prescriptive Measures

Measure Category	*Ex Ante Annual kWh Savings*	*Ex Post Annual Gross kWh Savings*	*Gross Realization Rate*
Air Conditioner	54,496	66,894	123%
Engineered Nozzles Compressed Air	2,532,610	1,575,360	62%
Exterior LED	7,367	9,230	125%
LED Downlight	16,036	16,999	106%
LED Exterior Fixture	92,627	120,454	130%
LED High Bay	1,261,487	992,331	79%
LED Low Bay	782,853	727,030	93%
LED Other	3,400	3,738	110%
LED Troffer	33,270	29,065	87%
Linear LED	507,326	490,014	97%
Total	5,291,472	4,031,114	76%

ADM calculated a kWh energy savings gross realization rate and a peak kW reduction gross realization rate for each site in the M&V sample. Sites with relatively high or low gross realization rates were analyzed to determine the reasons for the discrepancy between ex ante and ex post energy savings. The site-level gross impact analysis results for each M&V sample site are presented in Volume II of the report. These reports outline the data sources and analytical approaches employed in the calculation of measure impacts.

2.3.2. Results of Ex Post Gross Savings Estimations

The kWh gross realization rate is the ratio of sampled measure ex post gross kWh energy savings to sampled measure ex ante kWh energy savings. The kW gross realization rate is the ratio of sampled measure ex post gross kW demand savings to sampled measure ex ante kW demand savings. Since a stratified sampling approach was employed for this program, stratum-level kWh and kW gross realization rates were developed for each sampling stratum.

Program-level gross ex post gross kWh energy savings are calculated as follows:

- The ex-ante kWh energy savings of non-sampled measures are factored by the applicable stratum-level kWh gross realization rates to calculate ex post gross kWh energy savings for non-sampled measures.
- The ex post gross kWh energy savings of all sampled measures and all non-sampled measures are summed.

Program-level gross ex post gross kW demand savings are calculated as follows:

- The ex-ante kW demand savings of non-sampled measures are factored by the applicable stratum-level kW gross realization rates to calculate ex post gross kW savings for non-sampled measures.

- The ex post gross kW demand savings of all sampled measures and all non-sampled measures are summed.

2.3.2.1. Ex Post Gross kWh Savings

Table 2-4 displays the ex ante and ex post gross kWh savings of the Work Prescriptive Program including gross realization rates for sampled projects.

Table 2-4 Work Prescriptive Project-Level Ex Ante and Ex Post kWh Savings

Stratum	*Project Number*	*Measure*	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Project Gross Realization Rate*
1	100	Engineered Nozzles Compressed Air	1,262,914	705,600	56%
1	101	LED Downlight	745,470	706,822	95%
1	102	LED Troffer	642,071	654,915	102%
1	103	Engineered Nozzles Compressed Air	577,344	434,880	75%
1	104	Engineered Nozzles Compressed Air	577,332	322,560	56%
2	107	LED Troffer	312,458	189,269	61%
2	109	LED Exterior Fixture	212,039	204,358	96%
2	127	LED High Bay	203,027	187,434	92%
3	108	Linear LED	106,722	112,562	105%
3	110	LED High Bay	176,683	51,333	29%
3	111	Engineered Nozzles Compressed Air	115,020	112,320	98%
3	112	LED Troffer	84,692	69,031	82%
4	113	LED Other	80,555	61,218	76%
4	114	Air Conditioner	50,669	58,880	116%
4	115	Linear LED	40,612	25,544	63%
4	116	LED High Bay	31,737	26,269	83%
5	117	LED High Bay	27,598	52,156	189%
5	119	Linear LED	14,130	13,141	93%
5	120	LED Troffer	9,666	8,782	91%
5	121	LED High Bay	6,566	6,674	102%
5	123	LED Exterior Fixture	4,286	13,081	305%
5	124	Linear LED	4,158	4,717	113%
5	125	Air Conditioner	3,827	8,014	209%
5	126	Linear LED	1,895	1,551	82%
All Non-Sample Projects			24,585,107	21,305,590	87%
Total			29,876,578	25,336,704	85%

Five of the 24 sampled prescriptive projects had a realization rate that was higher than 110%.

- Project 114 (HVAC – Rooftop Units). The ex post savings exceeded ex ante due to inconsistencies in deemed energy savings for small-capacity packaged air conditioners. The ex ante savings used a prescriptive per-ton savings value that appears overestimated for units under 65,000 BTUh, particularly for SEER 21 equipment. Ex post savings calculations, based on the installed units' verified efficiency and operational data, resulted in a realization rate of 116%.
- Project 117 (Midstream LED High Bay Lighting). The ex post savings exceeded ex ante due to more accurate wattage assumptions for the replaced and installed fixtures. The ex ante savings were not provided, while the ex post analysis relied on verified wattage, lumen equivalence, and operating hours derived from AMI interval data. This resulted in a realization rate of 189%.
- Project 123 (Exterior HID to LED Lighting). The ex post savings exceeded ex ante due to differences in the assumed baseline wattage. The ex ante analysis appears to have been based on 400W HID fixtures, while the ex post savings applied a baseline wattage of 1080W, supported by lumen equivalence of the installed LED fixtures. This adjustment resulted in a realization rate of 305%.
- Project 124 (Midstream LED Lighting). The ex post savings exceeded ex ante due to differences in assumed operating hours and fixture equivalence. The ex ante savings methodology was not provided, while the ex post analysis used verified installed wattages, lumen equivalence, and participant-reported hours of use, supported by AMI interval data. This resulted in a realization rate of 113%.
- Project 125 (Prescriptive HVAC – Split AC Units). The ex post savings exceeded ex ante due to differences in the number of incentivized units. The ex ante savings appeared to reflect only a subset of the installed units, whereas the ex post analysis verified all ten installed units, aligning with the total project incentive. This adjustment resulted in a realization rate of 209%.

Ten of the sampled prescriptive projects had realization rates lower than 90%.

- Projects 100 & 104 (Low Flow Air Nozzles). The ex post savings were lower than ex ante due to differences in assumed baseline nozzle air flow rates. The ex ante analysis estimated standard nozzle air flow using TRM assumptions, while the ex post analysis applied manufacturer specifications and a 50% reduction factor per the TRM methodology. These adjustments resulted in a realization rate of 56%.
- Projects 103 (Low Flow Air Nozzles). The ex post savings were lower than ex ante due to differences in baseline air flow assumptions. The ex ante analysis estimated base case flow as twice the efficient flow, while the ex post analysis refined these values based on manufacturer specifications and TRM methodology. These adjustments resulted in a realization rate of 56%.

- Project 107 (LED Lighting). The ex post savings were lower than ex ante due to differences in assumed operating hours and baseline fixture wattage. The ex ante savings used standard TRM assumptions, while the ex post analysis applied site-specific AMI interval data and survey-verified fixture types, leading to a realization rate of 61%.
- Project 110 (Midstream LED High Bay Lighting). The ex post savings were lower than ex ante due to differences in assumed operating hours. The ex ante savings were based on TRM prototypical retail store hours, while the ex post analysis used site-specific AMI interval data, resulting in a realization rate of 29%.
- Project 112 (Retail LED Lighting). The ex post savings were lower than ex ante due to differences in assumed operating hours for high bay fixtures. The ex ante savings were based on industrial building hours, while the ex post analysis applied retail-specific hours verified through AMI interval data, leading to a realization rate of 82%.
- Project 113 (LED High Bay & Exterior Wall Packs). The ex post savings were lower than ex ante due to differences in assumed operating hours for high bay lighting. The ex ante analysis used standard TRM industrial building assumptions, while the ex post analysis incorporated AMI interval data and site-verified operating schedules, leading to a realization rate of 76%.
- Project 115 (Retail LED Tubes). The ex post savings were lower than ex ante due to variations in base and installed fixture wattage. The ex ante analysis applied a standard TRM per-lamp savings, while the ex post analysis verified site-specific wattages and hours, resulting in a realization rate of 67%.
- Project 126 (Midstream LED Tubes). The ex post savings were lower than ex ante due to differences in assumed operating hours. The ex ante savings were based on TRM prototypical retail store hours, while the ex post analysis used site-specific operating schedules, leading to a realization rate of 82%.
- Project 201 (Compressed Air Leak Repair). The ex post savings were lower than ex ante due to differences in the application of system power reduction factors per reduced air demand. The ex ante analysis applied TRM values inconsistently across compressors, while the ex post analysis aligned with the TRM methodology, which implicitly includes a control factor. Additionally, the compressor's CAGI sheet indicated a zero-airflow rating of 110 kW, supporting the need for a control factor adjustment. These refinements resulted in a realization rate of 83%.

Table 2-5 presents the ex post annual gross kWh savings for the Work Prescriptive Program from January 2024 through December 2024.

Table 2-5 Ex Post Annual Gross kWh

Ex Ante Gross kWh Savings	*Gross Audited kWh Savings*	*Gross Verified kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
29,876,578	29,876,578	29,876,578	25,336,704	85%

2.3.2.2. Ex Post Gross kW Reductions

Table 2-6 presents the ex post peak kW reduction for the Work Prescriptive Program from January 2024 through December 2024.

Table 2-6 Ex Post Peak kW Reduction

Ex Ante Gross kW Savings	*Gross Audited kW Savings*	*Gross Verified kW Savings*	*Ex Post Gross kW Savings*	*Gross Realization Rate*
1,858.40	1,858.40	1,858.40	3,924.12	211%

2.4. Estimation of Ex Post Net Savings

The net savings analysis was used to determine what part of the gross energy savings achieved by program participants could be attributed to the effects of the program. The net savings attributed to program participants were the gross savings less free ridership, plus spillover.

2.4.1. Methodology for Estimating Free Ridership

A survey of program participants that asked them about the role of the program in their decision to implement the energy efficiency measures informed the net-to-gross analysis. ADM considered three factors to determine what percentage of savings could be attributable to free ridership. The three factors were:

- Plans and intentions of the firm to install a measure even without support from the program
- Influence that the program had on the decision to install a measure
- A firm's previous experience with a measure installed under the program

For each of these factors, ADM applied rules to develop binary variables indicating whether a participant's behavior showed free ridership. These rules made use of answers to questions on the decision-maker survey questionnaire.

The first factor required determining if a participant's intention was to install an energy efficiency measure even without the program. The answers to a combination of several questions were used with a set of rules to determine whether a participant's behavior indicated likely free ridership. Two binary variables accounted for customer plans and intentions: one, based on a more restrictive set of criteria that may describe a high likelihood of free ridership, and a second, based on a less restrictive set of criteria that may describe a relatively lower likelihood of free ridership.

The first, more restrictive criteria indicating customer plans and intentions that likely signify free ridership were as follows:

- The respondent answered "yes" to the following two questions: "Did you have plans to install the measure before participating in the program?" and "Would you have completed the [MEASURE] project even if you had not participated in the program?"
- The respondent answered "definitely would have installed" to the following question: "If the financial incentive from the [PROGRAM] had not been available, how likely is it that you would have installed [MEASURE] anyway?"
- The respondent answered "did not affect the timing of purchase and installation" to the following question: "How did the availability of information and financial incentives through the [PROGRAM] affect the timing of your purchase and installation of [MEASURE]?"
- The respondent answered "no, the program did not affect the level of efficiency that we chose for equipment" in response to the following question: "Did you purchase and install the [MEASURE] earlier than you otherwise would have without the program?"

The second, less restrictive criteria that indicate customer plans and intentions that likely signify free ridership are as follows:

- The respondent answered "yes" to the following two questions: "Did you have plans to install the [MEASURE] before participating in the program?" and "Would you have completed the [MEASURE] project even if you had not participated in the program?"
- The respondent answered either "definitely would have installed" or "probably would have installed" to the following question: "If the financial incentive from the [PROGRAM] had not been available, how likely is it that you would have installed [MEASURE] anyway?"
- The respondent answered "did not affect the timing of purchase and installation" to the question: "Did you purchase and install the [MEASURE] earlier than you otherwise would have without the program?" or the respondent indicated that while program information and financial incentives did affect the timing of equipment purchase and installation, in the absence of the program they would have purchased and installed the equipment within the next two years.
- The respondent answered "no, the program did not affect the level of efficiency that we chose for equipment" in response to the following question: "Did you choose equipment that was more energy-efficient than you would have chosen because of the program?"

The second factor requires determining if a customer reports that a recommendation from a Program representative or experience with the program was influential in the decision to install a particular piece of equipment or measure. The criterion indicating that program influence may signify a lower likelihood of free ridership is that either of the following conditions is true:

- The respondent answered "very important" to the following question: "How important was previous experience with the [Program Name] in making your decision to install [Equipment/Measure]?"
- The respondent answered "yes" to the following question: "Did a representative of the [Program Name] recommend that you install [Equipment/Measure]?"

The third factor requires determining if a participant in the program indicates that he or she had previously installed an energy efficiency measure like the one that they installed under the program without an energy efficiency program incentive during the last three years. A participant indicating that he or she had installed a similar measure is considered to have a likelihood of free ridership. The criteria indicating that previous experience may signify a higher likelihood of free ridership are as follows:

- The respondent answered "yes" to the following question: "Before participating in the [Program Name], had you installed any equipment or measure similar to [Rebated Equipment/Measure] at your facility?"
- The respondent answered "yes, purchased energy-efficient equipment but did not apply for a financial incentive" to the following question: "Has your organization purchased any energy-efficient equipment in the last three years for which you did not apply for a financial incentive through the [Program Name]?"

The four sets of rules just described are used to construct four different indicator variables that address free ridership behavior. For each customer, a free ridership value is assigned based on the combination of variables. With the four indicator variables, there are 12 applicable combinations for assigning free ridership scores for each respondent, depending on the combination of answers to the questions creating the indicator variables. Table 2-7 shows these values.

Table 2-7 Free Ridership Scoring

Indicator Variables				*Free Ridership Score*
Had Plans and Intentions to Install Measure without the Program? (Definition 1)	*Had Plans and Intentions to Install Measure without the Program? (Definition 2)*	*The Program had influence on Decision to Install Measure?*	*Had Previous Experience with Measure?*	
Y	Y	Y	Y	100%
Y	Y	N	Y	100%
Y	Y	N	N	100%
Y	Y	Y	N	67%
N	Y	N	Y	67%
N	Y	Y	Y	33%
N	Y	N	N	33%
N	N	N	Y	33%
N	Y	Y	N	0%
N	N	Y	Y	0%
N	N	Y	N	0%
N	N	N	N	0%

The free ridership assessment also included questions on the participants' financial ability to pay for the measures. These questions were used to assess the consistency of the responses to the questions used to score free ridership.

Responses are considered inconsistent if the respondent indicates that they were not financially able to install the equipment, but state that they have plans to install the equipment and would have installed it without the program incentive. There were no cases where respondents reported this and that they could not have afforded the measure without program support.

2.4.1.1. Methodology for Estimating Spillover

Program participants could implement additional energy saving measures without receiving a program incentive because they participated in the program. The energy savings resulting from these additional measures constitute program participant spillover effects.

To assess participant spillover savings, survey respondents are asked whether or not they implemented any additional energy saving measures for which they did not receive a program incentive. Respondents are also asked to provide information on the measures implemented for use in estimating the associated energy savings.

To determine if the savings from the reported measures were attributable to the program, survey respondents were asked questions about the degree to which their experience with the program influenced them to implement the measures and the likelihood of implementing the measures in the absence of the program. Specifically, respondents were asked the following questions:

- SO1: How important was your experience with the [PROGRAM_NAME] in your decision to install this lighting equipment?
- SO2: If you had NOT participated in the [PROGRAM_NAME], how likely is it that your organization would still have installed this lighting equipment?

ADM calculated the spillover score using Equation 2-1.

Equation 2-1

$$Spillover = Average(SO1,\ 10 - SO2)$$

Savings from measures associated with a spillover score greater than 7 were considered attributable to the program.

All survey response data were systematically reviewed by a researcher who was familiar with the portfolio. As part of this review, the researcher could determine whether the available information justifies modifying the spillover score calculated in accordance with the algorithm outlined below. The spillover score calculated in accordance with the algorithm outlined above could be revised in instances in which there were significant apparent inconsistencies between responses provided by the decision maker or in cases in which the responses were apparently invalidated by other information regarding the measure(s). Additionally, responses may be dropped in cases where respondents do not report sufficient information to estimate the savings associated with the measure implemented.

2.4.2. Results of Ex Post Net Savings Estimation

Table 2-8 summarizes the net ex post kWh savings and the net ex post kW demand reduction of the Work Prescriptive Program.

Table 2-8 Ex Post Net kWh and kW Savings

Category	*kWh*	*kW*
Ex Ante Gross Savings	29,876,578	1,858.40
Gross Audited Savings	29,876,578	1,858.40
Gross Verified Savings	29,876,578	1,858.40
Ex Post Gross Savings	25,336,704	3,924.12
Gross Realization Rate	85%	211%
Ex Post Free Ridership	1,187,271	334.89
Ex Post Non-Participant Spillover	0	-
Ex Post Participant Spillover	0	-
Ex Post Net Savings	24,149,433	3,589.23
Net-to-Gross Ratio	95%	91%
Ex Post Net Lifetime Savings	347,771,689	N/A

2.5. Process Evaluation

ADM completed a process evaluation of the PY2024 program. The following research activities informed the process evaluation.

- Interviews and discussions with program staff.
- Review of program documents and tracking data.
- A survey of program participants.

2.5.1. Process Evaluation Findings

ADM interviewed program staff and completed a survey of program participants. The interviews with program staff provided information on how the program was implemented in 2024, changes made since 2023, and key successes and challenges. Surveys provided feedback from customers on their perspective of program processes.

2.5.1.1. Program Operations

2.5.1.1.1. Roles and Responsibilities

ADM interviewed the energy efficiency manager to assess the Work Prescriptive Program's operations and impacts for 2024. The program manager has continued to oversee the Work Prescriptive Program throughout 2024. The role involves managing program implementation and addressing operational requirements, with no significant changes in responsibilities from previous years.

2.5.1.1.2. Outreach and Marketing

The C&I Work programs in Indiana enhanced outreach and focused on formal site audits to support key customers and reduce their initial investment burden. The C&I programs in Indiana utilized various outreach activities, including annual kickoff meetings, Chamber of Commerce events, and multiple speaking engagements. The CLEAResult field team participated in a virtual conference and conducted site visits to identify potential projects. Increased emphasis on formal site audits was implemented, particularly for key customers who might consider opting out. Audits offered through the program aim to reduce customers' initial investment burden.

Marketing efforts effectively used display ads, paid search ads, and targeted newsletters to boost visibility and engagement, with a notable incentive bonus and targeted messaging for small businesses. Marketing efforts included display ads and paid search ads to enhance visibility, along with monthly newsletters that provided updates and incentives, achieving strong engagement metrics. An incentive bonus was introduced to boost savings achievements, and targeted messaging was used to engage small businesses with the Small Business Direct Install Program. Digital and physical materials, such as program fact sheets and brochures, were created to provide detailed program information. Newsletters achieved strong engagement rates.

The focus in Indiana shifted from compressed air bonuses to supporting measures with longer payback periods and higher capital investments.

Ex ante savings decreased for custom measures but increased for prescriptive measures in PY2024. Table 2-9 summarizes PY2023 and PY2024 participation.

Table 2-9 PY2023 and PY2024 Participation

Program	*Ex Ante Savings*	
	PY2023	*PY2024*
Work Custom	46,641,686	33,030,210
Work Prescriptive	24,048,482	29,876,578

2.5.1.1.3. Program Changes to Measures and Incentives

The Work Program for 2024 remained consistent, with no significant changes to the program design. There were no significant changes made to the list of available measures in the Work Program for 2024.

CLEAResult focused on re-engaging large customers and improving outreach to smaller businesses unaware of energy efficiency programs. CLEAResult has prioritized engagement with large customers and collaborated with key account managers. Efforts have been directed towards re-engaging customers who had previously opted out. Notably, a large company rejoined the program last year because of these efforts. In addition, focus groups revealed that smaller businesses were often unaware of energy efficiency programs. CLEAResult was instructed to increase engagement with these businesses through targeted outreach, ensuring they benefit from available programs.

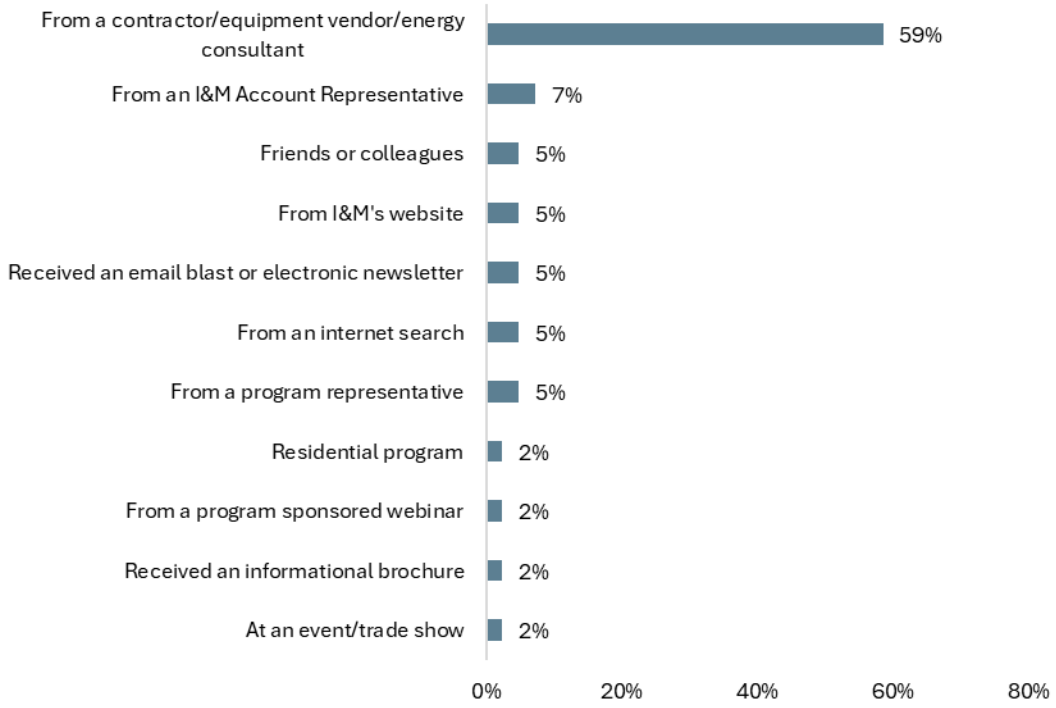
2.5.1.1.4. Energy Efficiency Savings Program (EESP) with Allumia

No projects were completed through the EESP service. In 2024, no projects were completed through the EESP service. Although there were discussions with a couple of customers, they ultimately secured financing through other channels.

2.5.1.2. Participant Survey Findings

Most respondents (59%) learned about the program through a contractor, equipment vendor, or energy consultant (see Figure 2-1). Smaller percentages referenced sources such as utility account representatives, colleagues or friends, the utility's website, email newsletters, internet searches, program representatives, and various outreach methods, including brochures, webinars, and trade shows.

Figure 2-1 Sources of Program Awareness (n = 41)

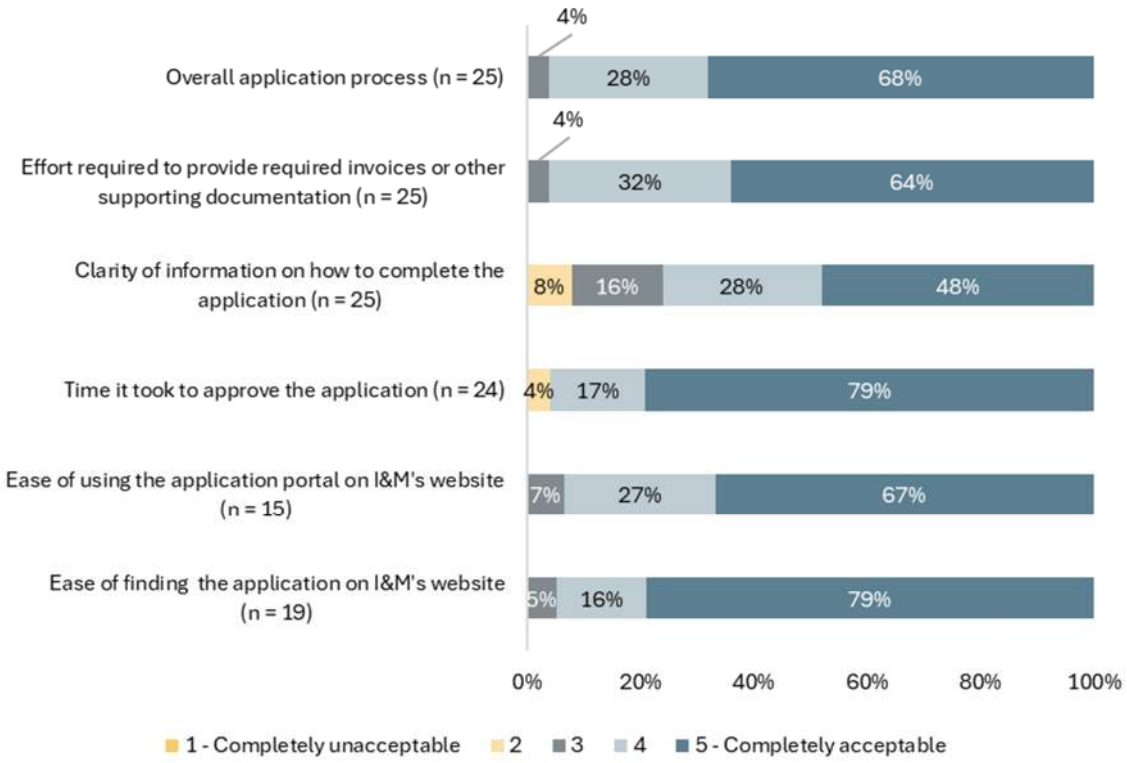


Most respondents did not receive an onsite energy evaluation, but among those who did, most implemented all recommended energy efficiency measures. Twenty-seven percent of respondents indicated that the field representative completed an onsite energy evaluation or survey of their facility, while 73% reported that no onsite evaluation or survey was completed. Following the initial assessment, 67% of respondents stated they implemented all recommended energy efficiency measures, while none reported leaving any measures uninstalled. Additionally, 33% did not recall whether they implemented the recommended measures.

Respondents generally found the application process to be straightforward and efficient. Eighty-four percent of survey respondents had a clear sense of whom to go to for assistance with the application process. The ease of finding the application was rated as acceptable (cited as a 4 or 5 on a 5-point scale) by 95% of respondents, and 94% found the application portal easy to use. Additionally, 96% found the approval time acceptable, 76% found the clarity of instructions acceptable, and the effort required to provide supporting documentation was viewed favorably by 96% of respondents. Overall, 96% of respondents found the application process acceptable (see Figure 2-2).

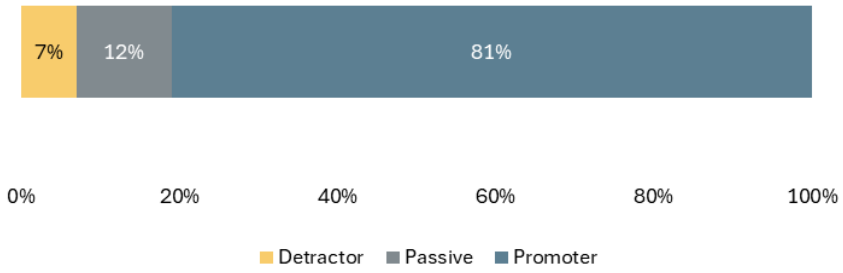
Respondents provided feedback on how to improve the application process, including the need for clearer instructions, particularly for custom lighting projects. Some noted that certain terms were unclear to the public and that there was no accessible support for clarification. However, one respondent indicated that their contractor provided all necessary information.

Figure 2-2 Acceptability of the Application Process



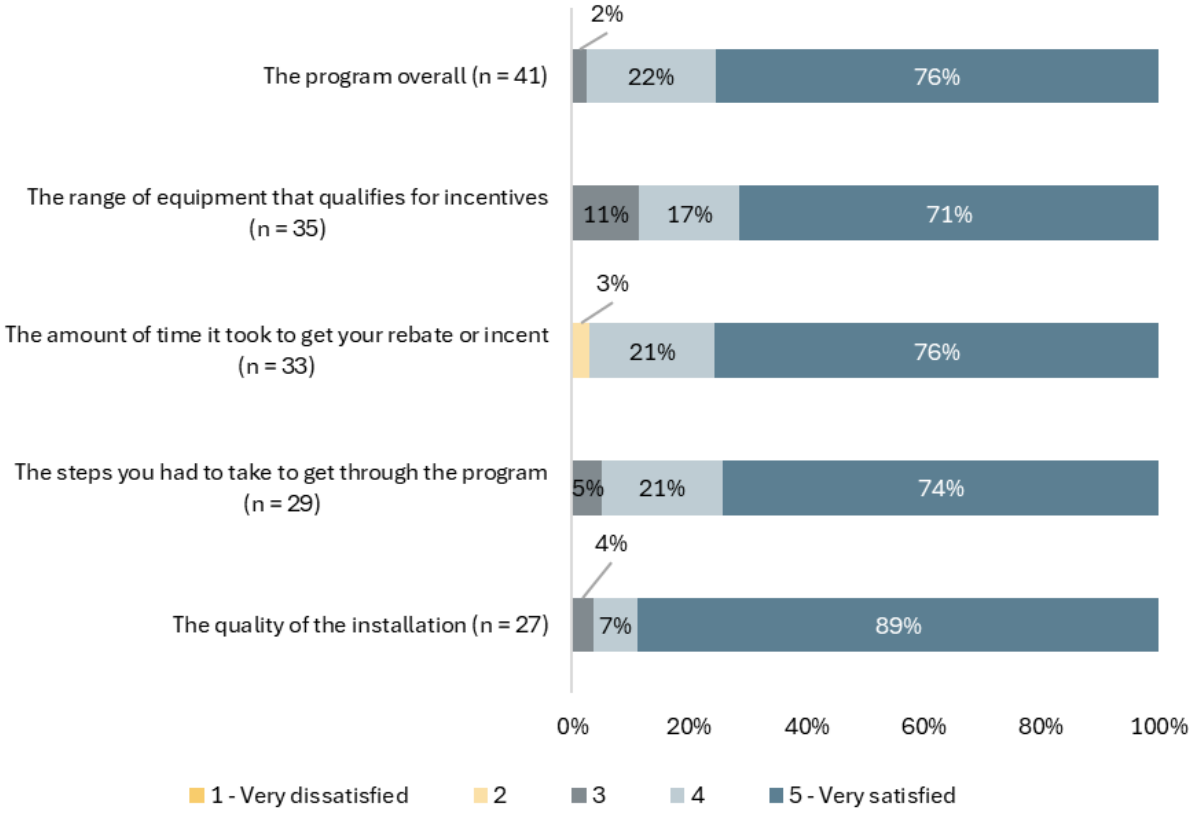
The Work programs received a net promoter score of 74%. Of the survey respondents, 81% were classified as promoters, 12% as passive, and 7% as detractors (see Figure 2-3). Promoters found the program easy to join and valuable, appreciated the cost savings, rebates, and energy-efficient upgrades. They found the application process is quick and simple. Participants discovered new energy-saving opportunities like air leaks and lighting upgrades. Most passive respondents had a positive view of the program, but they did note that the paperwork can be cumbersome and time-consuming. One respondent suggested that I&M could improve the selection and oversight of contractors, emphasizing the importance of ensuring contractors fulfill their obligations to avoid negative impacts on I&M's reputation. The detractors highlighted two main concerns: one respondent felt disconnected from the program as the contractor handled everything, and another mentioned not noticing a significant difference in the lighting. Additionally, one respondent expressed frustration over not receiving their rebate yet.

Figure 2-3 Net Promoter Score (n = 42)



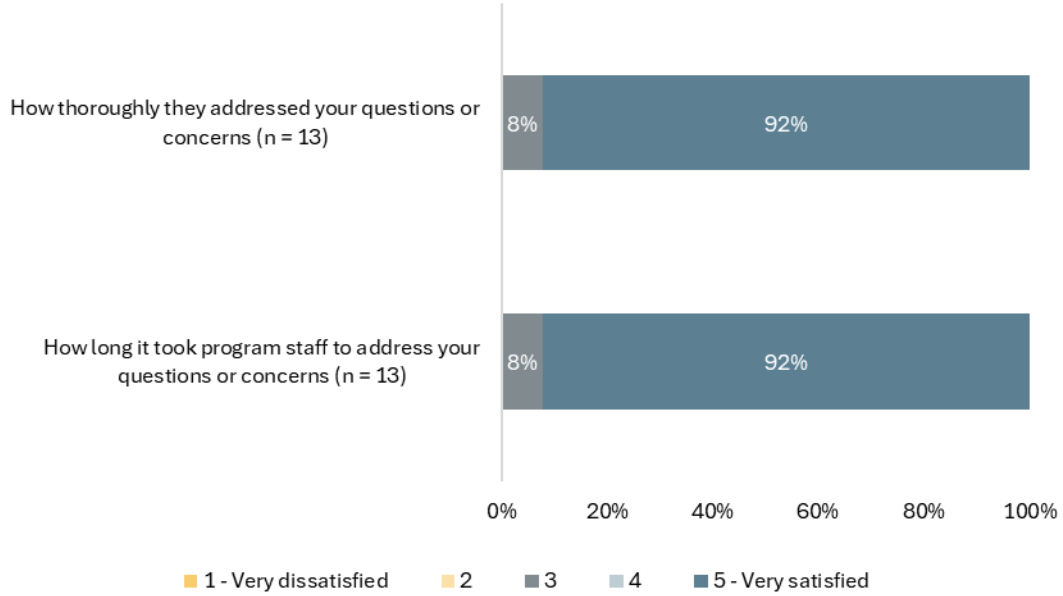
Most participants (98%) were satisfied with the program overall. Additionally, most respondents were satisfied with the range of qualifying equipment, the amount of time it took to receive the rebate, the steps it took to get through the program, and the quality of the installation (see Figure 2-4). Ninety-five percent of survey respondents indicated they were satisfied with the I&M as their electricity service provider.

Figure 2-4 Program Satisfaction



Among the 13 survey respondents who interacted with program staff, 92% expressed satisfaction with the promptness and thoroughness of the staff's responses to their questions (see Figure 2-5).

Figure 2-5 Timeliness and Thoroughness of Program Staff's Ability to Answer Questions



Respondents suggested improving program accessibility and efficiency. Ideas included easier application access, clearer instructions, better advertising, larger rebates for expensive equipment, extended project timelines, reduced paperwork, and quicker rebate processing.

2.6. Findings and Recommendations

The program is functioning well for participants, with 98% expressing overall satisfaction and similarly high ratings across most aspects. While feedback was largely positive, one participant noted some dissatisfaction with the rebate processing time. Of the 13 customers who engaged with staff, 92% reported being very satisfied with the thoroughness of responses and the time taken to address their questions.

The application process was generally well-received by respondents, with high satisfaction across key aspects, including ease of access, portal usability, and approval timelines. Most respondents knew where to seek assistance, and the majority found the required effort to be reasonable. However, some respondents suggested improvements, particularly clearer instructions for custom lighting projects and more accessible support for clarifications.

3. Work Custom

This chapter presents the results of both the impact and process evaluations of the Work Custom Program that Indiana Michigan Power (I&M) offered to its non-residential customers from January 2024 through December 2024.

The objectives of the evaluation are to:

- Complete project pre-approval reviews;
- Assess gross and net energy (kWh) savings and peak demand (kW) reductions resulting from participation in the program during the program year;
- Complete a limited process evaluation of the program; and
- Provide recommendations for program improvement as appropriate.

3.1. Program Description

This program is available to commercial, industrial, and institutional accounts. The program is a custom program, designed to develop productive energy savings opportunities in cooperation with the customer. Each project will be specially designed. It is expected that projects will need to be carried out in narrow time windows as dictated by conditions specific to the customer's operations and that evaluation will consist primarily of short-term instrumentation and spot metering. The hurdle rate for projects under this program will be set to help ensure cost-effective projects are selected.

Customer incentive levels are set at $0.05 per kWh saved for non-lighting measures and $0.06 per kWh for lighting measures.

Eligible program measures may include lighting, lighting controls and systems, process improvements, new construction projects, compressed air systems, HVAC systems, and building retro commissioning, for example.

3.2. Data Collection

3.2.1. Verification of Measures

3.2.1.1. Sampling Plan

The sampling approach was combined for all C&I programs in 2024. The approach is described in Section 2.2.1.1 of this document on page 7.

The table below shows the number of projects, ex ante gross kWh energy savings, and sampling statistics, by stratum, of the program sample.

Table 3-1 Population Statistics Used for Work Custom Sample Design

Variable	*Stratum 1*	*Stratum 2*	*Stratum 3*	*Stratum 4*	*Stratum 5*	*Totals*
Strata boundaries (kWh)	> 500000	250000 - 500000	120000 - 250000	65000 - 120000	< 65000	
Number of projects	10	22	55	36	168	291
Total Ex Ante Annual kWh	8,169,669	7,331,176	9,677,836	3,341,022	4,510,507	33,030,210
Average kWh Savings	816,967	333,235	175,961	92,806	26,848	1,445,817
Std. dev. of kWh savings	413,852	58,182	39,652	18,151	17,085	546,921
Coefficient of variation	0.51	0.17	0.23	0.2	0.64	
Final design sample	8	3	4	1	5	21

3.2.1.2. Verification Data Collection Procedure

The data collection procedure for the Work Custom Program was the same as the approach described in Section 2.2 of this document on page 8.

3.2.2. Participant Survey

The survey data collection for the Work Custom Program is described in Section 2.5.1.2 of this document on page 22.

3.2.3. Staff Interviews

The staff interviews completed for the Work Custom Program is described in Section 2.5.1.1 of this document on page 21.

3.3. Estimation of Ex Post Gross Savings

3.3.1. Methodology for Estimating Ex Post Gross Savings

3.3.1.1. Review of Documentation

The process for reviewing program documentation for the Work Custom Program was the same as the approach described in Section 2.3.1.1 of this document on page 10.

3.3.1.2. Procedures for Estimating Measure-Level Gross Energy Savings

A breakdown of sampled measures for the Work Custom Program is below in Table 3-2.

Table 3-2 Breakdown of Sampled Custom Measures

Measure Category	*Ex Ante Annual kWh Savings*	*Ex Post Annual Gross kWh Savings*	*Gross Realization Rate*
Compressed Air	6,266,062	6,086,482	97%
Lighting LED upgrade	627,565	544,226	87%
HVAC Systems	1,438,510	848,420	59%
Custom RCx	872,969	872,969	100%
Total	9,205,106	8,352,097	91%

ADM calculated a kWh energy savings gross realization rate and a peak kW reduction gross realization rate for each site in the M&V sample. Sites with relatively high or low gross realization rates were analyzed to determine the reasons for the discrepancy between ex ante and ex post energy savings. The site-level gross impact analysis results for each M&V sample site are presented in Volume II of the report. These reports outline the data sources and analytical approaches employed in the calculation of measure impacts.

3.3.2. Results of Ex Post Gross Savings Estimation

The kWh gross realization rate is the ratio of sampled measure ex post gross kWh energy savings to sampled measure ex ante kWh energy savings. The kW gross realization rate is the ratio of sampled measure ex post gross kW demand savings to sampled measure ex ante kW demand savings. Since a stratified sampling approach was employed for this program, stratum-level kWh and kW gross realization rates were developed for each sampling stratum.

Program-level gross ex post gross kWh energy savings are calculated as follows:

- The ex-ante kWh energy savings of non-sampled measures are factored by the applicable stratum-level kWh gross realization rates to calculate ex post gross kWh energy savings for non-sampled measures.
- The ex post gross kWh energy savings of all sampled measures and all non-sampled measures are summed.

Program-level gross ex post gross kW demand savings are calculated as follows:

- The ex-ante kW demand savings of non-sampled measures are factored by the applicable stratum-level kW gross realization rates to calculate ex post gross kW savings for non-sampled measures.
- The ex post gross kW demand savings of all sampled measures and all non-sampled measures are summed.

3.3.2.1. Ex Post Gross kWh Savings

Table 3-3 displays the ex ante and ex post gross kWh savings of the Work Custom Program including gross realization rates for sampled projects.

Table 3-3 Work Custom Project-Level Ex Ante and Ex Post kWh Savings

Stratum	*Project Number*	*Measure*	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Project Gross Realization Rate*
1	200	Compressed Air	1,914,172	1,914,172	100%
1	201	Compressed Air	901,106	751,576	83%
1	202	Custom RCx	872,969	872,969	100%
1	203	HVAC Systems	834,492	663,436	80%
1	204	Compressed Air	820,415	829,130	101%
1	205	Compressed Air	631,999	586,885	93%
1	206	HVAC Systems	604,018	184,984	31%
1	207	Compressed Air	540,177	540,177	100%
2	208	Compressed Air	403,438	505,236	125%
2	209	Lighting LED upgrade	357,250	203,247	57%
2	210	Lighting LED upgrade	257,572	324,001	126%
3	212	Compressed Air	249,900	218,902	88%
3	213	Compressed Air	246,054	246,054	100%
3	214	Compressed Air	219,147	154,147	70%
3	215	Compressed Air	194,914	194,914	100%
4	218	Compressed Air	85,360	85,360	100%
5	219	Compressed Air	21,576	22,125	103%
5	220	Lighting LED upgrade	10,201	11,312	111%
5	221	Compressed Air	7,473	7,473	100%
5	222	Compressed Air	30,331	30,331	100%
5	223	Lighting LED upgrade	2,542	5,666	223%
All Non-Sample Projects			23,825,104	23,168,311	97%
Total			33,030,210	31,520,408	95%

Four of the 21 sampled prescriptive projects had a realization rate that was higher than 110%. The factors that resulted in the realization rates were idiosyncratic to the project and are summarized below.

- Project 208 (Compressed Air Leak Repair). The ex post savings were higher than ex ante due to differences in the assumed system power reduction per reduced air demand. The ex ante savings were determined using a previous version of the air leak calculator, which was not based on the Indiana TRM method. The ex post analysis applied the TRM-prescribed kW/CFM value (0.152), which was higher than the ex ante assumption (0.121), resulting in a realization rate of 125%.
- Project 210 (Custom LED Lighting). The ex post savings were higher than ex ante due to site-specific verification of high illumination levels and confirmation of manufacturing operations. While the ex post analysis applied the IECC 2018 lighting power density

standard instead of ASHRAE 90.1-2007, the adjusted assumptions on operating hours and space use resulted in a realization rate of 126%.

- Project 220 (Lighting Retrofit). The ex post savings exceeded ex ante due to a refined assessment of baseline and installed fixture wattages. The ex ante analysis assumed standard TRM values, while the ex post evaluation incorporated site-verified fixture details and AMI interval data, leading to a realization rate of 111%.
- Project 223 (Lighting Retrofit). The ex post savings were higher than ex ante due to differences in the assumed baseline wattage for 8' T8 fluorescent lamps. The ex ante analysis applied standard TRM assumptions, while the ex post evaluation verified manufacturer specifications, leading to a realization rate of 223%.

Six of the sampled projects had realization rates below 90%, primarily due to differences in baseline assumptions, equipment efficiency ratings, and application of TRM methodologies. The key factors contributing to lower realization rates for each project are summarized below:

- Project 201 (Compressed Air Leak Repair). The ex post savings were lower than ex ante due to differences in the application of system power reduction factors per reduced air demand. The ex ante analysis applied TRM values inconsistently across compressors, while the ex post analysis aligned with the TRM methodology, which implicitly includes a control factor. Additionally, the compressor's CAGI sheet indicated a zero-airflow rating of 110 kW, supporting the need for a control factor adjustment. These refinements resulted in a realization rate of 83%.
- Project 203 (LED Lighting). The ex post savings were lower than ex ante due to differences in baseline lighting power density (LPD) assumptions. The ex ante analysis applied a baseline LPD of 1.20 W/SF for interior lighting and 0.15 W/SF for parking areas, while the ex post analysis used 1.05 W/SF and 0.08 W/SF, respectively, consistent with Indiana TRM guidance. These baseline adjustments resulted in a realization rate of 75%.
- Project 206 (Process Chillers). The ex post savings were significantly lower than ex ante due to inconsistencies in efficiency ratings applied to the baseline and installed chillers. The ex ante analysis used full-load efficiency for the baseline while applying part-load efficiency for the new equipment, overstating savings. The ex post analysis corrected this by applying part-load efficiency consistently, resulting in a realization rate of 31%.
- Project 209 (Lighting Power Density – New Construction). The ex post savings were lower than ex ante due to an updated baseline assumption. The ex ante analysis applied ASHRAE 90.1-2007, whereas the ex post analysis referenced IECC 2018, which reflects more efficient lighting standards. The lower baseline lighting power density reduced the estimated savings, resulting in a realization rate of 57%.
- Project 212 (Compressed Air Leak Repair). The ex post savings were slightly lower than ex ante due to differences in the assumed air compressor efficiency. The ex ante analysis used full load efficiency without applying a control factor, while the ex post analysis followed Indiana TRM guidance, incorporating a system power reduction factor. This adjustment resulted in a realization rate of 88%.

- Project 214 (Compressed Air Leak Repair). The realization rate of 70% was primarily due to differences in assumed compressor efficiency. The ex ante analysis applied full load efficiency without a control factor, while the ex post analysis followed Indiana TRM guidance, incorporating a system power reduction factor. Additionally, interval billing data indicated that the compressed air system did not operate 24/7, contributing to the lower savings.

Table 3-4 Ex Post Annual Gross kWh

Ex Ante Gross kWh Savings	*Gross Audited kWh Savings*	*Gross Verified kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
33,030,210	33,030,210	33,030,210	31,520,408	95%

3.3.2.2. Ex Post Gross kW Reductions

Table 3-5 presents the ex post peak kW reduction for the Work Custom Program during the period January 2024 through December 2024.

Table 3-5 Ex Post Peak kW

Ex Ante Gross kW Savings	*Gross Audited kW Savings*	*Gross Verified kW Savings*	*Ex Post Gross kW Savings*	*Gross Realization Rate*
3,313.17	3,313.17	3,313.17	5,962.01	180%

3.4. Estimation of Ex Post Net Savings

3.4.1. Methodology for Estimating Ex Post Net Savings

The procedure for the estimation of net program-level kWh energy savings and program-level kW demand reductions was the same as the approach described in Section 2.4 of this document on page 16.

3.4.2. Results of Ex Post Net Savings Estimation

Table 3-6 summarizes the net ex post kWh savings and the net ex post kW demand reduction of the Work Custom Program.

Table 3-6 Ex Post Net kWh and kW Savings

Category	*kWh*	*kW*
Ex Ante Gross Savings	33,030,210	3,313.17
Gross Audited Savings	33,030,210	3,313.17
Gross Verified Savings	33,030,210	3,313.17
Ex Post Gross Savings	31,520,408	5,962.01
Gross Realization Rate	95%	180%
Ex Post Free Ridership	194,829	37.91
Ex Post Non-Participant Spillover	0	-
Ex Post Participant Spillover	0	-
Ex Post Net Savings	31,325,579	5,924.10
Net-to-Gross Ratio	99%	99%
Ex Post Net Lifetime Savings	168,304,402	N/A

3.5. Process Evaluation

Methods and findings related to the process evaluation of the Work Custom Program are presented in the Work Prescriptive Chapter in Section 2.5 on page 20.

3.6. Findings and Recommendations

Applicable conclusions and recommendations are presented in Section 2.6.

4. Work Direct Install

This chapter presents the results of both the impact and process evaluations of the Work Direct Install Program that Indiana Michigan Power (I&M) offered to its non-residential customers during the period of January 2024 through December 2024.

The objectives of the evaluation were to:

- Assess gross and net energy (kWh) savings and peak demand (kW) reductions resulting from participation in the program during the program year;
- Document and assess quality assurance and control procedures;
- Complete a process evaluation of the program; and
- Provide recommendations for program improvement as appropriate.

4.1. Program Description

The Work Direct Install Program targets energy efficiency improvements in small commercial/retail establishments, food service facilities and grocery store/supermarkets with demand of less than 150 kW by providing onsite energy assessments and incentives for energy efficient lighting and refrigeration equipment. The program measures are installed by a program qualified trade ally.

Work Direct Install incentives are provided on a per unit of equipment basis and focus on lighting and refrigeration measures.

Incentives are capped at $3,000 per site and $21,000 per company, across all programs.

4.2. Data Collection

4.2.1. Verification of Measures

4.2.1.1. Sampling Plan

ADM selected a sample of all 2024 projects for which ADM performed measurement and verification (M&V) and calculated gross realized kWh savings and kW demand reductions.

ADM used a stratified sampling approach to develop the M&V sample. A stratified sampling approach allowed for a given statistical precision and confidence level target to be met with a smaller sample size than would have been allowed by simple random sampling. Strata boundaries were based on ex ante kWh energy savings. ADM selected a sample with enough sample units to facilitate estimation of program ex post kWh energy savings with 10% statistical precision at a 90% confidence level.

Completed program projects accumulated over the course of the program year, and sample selection occurred at multiple points in time. The timing of sample selection was contingent upon the timing of the completion of projects during the program year.

The table below shows the number of projects, ex ante gross kWh energy savings, and sampling statistics, by stratum, of the program sample.

Table 4-1 Population Statistics Used for Work Direct Install Sample Design

Variable	*Stratum 1*	*Stratum 2*	*Stratum 3*	*Totals*
Strata boundaries (kWh)	> 30000	20000 - 30000	< 20000	
Number of projects	3	3	7	13
Total Ex Ante Annual kWh	355,457	75,153	84,635	515,245
Average kWh Savings	118,486	25,051	12,091	155,627
Std. dev. of kWh savings	43,711	1,314	5,192	50,217
Coefficient of variation	0.37	0.05	0.43	
Final design sample	3	1	2	6

4.2.1.2. Verification Data Collection Procedures

The data collection procedure for the Work Direct Install Program was the same as the approach described in Section 2.2 of this document on page 8.

4.2.2. Participant Survey

ADM administered a survey to Work Direct Install participants to collect data for use in estimating net savings and obtaining feedback about participants' experience with the program. Table 2-2 summarizes the survey data collection efforts. To increase the response rate, ADM engaged participants through both email and telephone communications. A concise version of the survey, focusing exclusively on questions related to free ridership, was administered to facilitate higher participation.

Table 4-2 Summary of Work Direct Install Data Collection

Survey	*Mode*	*Time Frame*	*Number of Contacts*	*Number of Completions*
Work Small Business Direct Install Participant Survey	Email and phone follow up	January 2024	9	5

4.3. Estimation of Ex Post Gross Savings

4.3.1. Methodology for Estimating Ex Post Gross Savings

4.3.1.1. Review of Documentation

The process for reviewing program documentation for the Work Direct Install Program was the same as the approach described in Section 2.3.1.1 of this document on page 10.

4.3.1.2. Procedures for Estimating Measure-Level Gross Energy Savings

A breakdown of sampled measures for the Work Direct Install Program is below in Table 4-3.

Table 4-3 Breakdown of Sampled Work Direct Install Measures

Measure Category	*Ex Ante Annual kWh Savings*	*Ex Post Annual Gross kWh Savings*	*Gross Realization Rate*
Exterior LED	25,087	16,719	67%
LED High Bay	206,842	179,899	87%
LED Interior Fixture	44,215	29,101	66%
Lighting Occupancy Sensors	121,105	61,132	50%
Linear LED	4,100	6,436	157%
Total	401,349	293,286	73%

ADM calculated a kWh energy savings gross realization rate and a peak kW reduction gross realization rate for each site in the M&V sample. Sites with relatively high or low gross realization rates were analyzed to determine the reasons for the discrepancy between ex ante and ex post energy savings. The site-level gross impact analysis results for each M&V sample site are presented in Volume II of the report. These reports outline the data sources and analytical approaches employed in the calculation of measure impacts.

4.3.2. Results of Ex Post Gross Savings Estimations

The kWh gross realization rate is the ratio of sampled measure ex post gross kWh energy savings to sampled measure ex ante kWh energy savings. The kW gross realization rate is the ratio of sampled measure ex post gross kW demand savings to sampled measure ex ante kW demand savings. Since a stratified sampling approach was employed for this program, stratum-level kWh and kW gross realization rates were developed for each sampling stratum.

Program-level gross ex post gross kWh energy savings are calculated as follows:

- The ex-ante kWh energy savings of non-sampled measures are factored by the applicable stratum-level kWh gross realization rates to calculate ex post gross kWh energy savings for non-sampled measures.
- The ex post gross kWh energy savings of all sampled measures and all non-sampled measures are summed.

Program-level gross ex post gross kW demand savings are calculated as follows:

- The ex-ante kW demand savings of non-sampled measures are factored by the applicable stratum-level kW gross realization rates to calculate ex post gross kW savings for non-sampled measures.
- The ex post gross kW demand savings of all sampled measures and all non-sampled measures are summed.

4.3.2.1. Ex Post Gross kWh Savings

Table 4-4 displays the ex ante and ex post gross kWh savings of the Work Direct Install Program including gross realization rates for sampled projects.

Table 4-4 Work Direct Install Project-Level Ex Ante and Ex Post kWh Savings

Stratum	*Project Number*	*Measure*	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Project Gross Realization Rate*
1	300	LED High Bay	164,160	166,851	102%
1	301	Lighting Occupancy Sensors	114,250	59,068	52%
1	302	LED Interior Fixture	77,047	33,048	43%
2	303	Linear LED	24,994	19,192	77%
3	304	Lighting Occupancy Sensors	16,705	11,165	67%
3	305	Exterior LED	4,192	3,962	95%
All Non-Sample Projects			113,897	84,655	74%
Total			515,245	377,941	73%

No sampled prescriptive projects had a realization rate over 110%.

Four of the six sampled prescriptive projects had a realization rate that was lower than 90%:

- Project 301 (Lighting – Occupancy Sensors). The ex post savings were significantly lower than ex ante due to differences in the assumed occupancy sensor savings factor. The ex ante analysis applied a higher deemed per-unit savings, while the ex post evaluation referenced installed fixture wattages, actual hours of use, and an Indiana TRM-based savings factor for occupancy sensors with high-end trim (dimming). This adjustment resulted in a realization rate of 52%.
- Project 302 (Lighting Retrofit – SBDI). The ex post savings were lower than ex ante due to site-specific verification of fixture wattages and operating hours. The ex ante analysis applied standard TRM assumptions, while the ex post evaluation determined that the industrial area had fewer operating hours (2,349) than assumed in the prescriptive savings calculation. Additionally, the base fixture wattages provided by the applicant were lower than those used in the ex ante estimates. These adjustments resulted in a realization rate of 43%.
- Project 303 (Lighting – Exterior and Interior Retrofit). The ex post savings were lower than ex ante due to differences in operating hours for exterior canopy lights and the treatment of interior LED tube replacements. The ex ante analysis assumed longer nighttime operating hours for exterior fixtures, while the ex post evaluation determined that canopy lighting was only illuminated from dusk to close, leading to an adjusted annual hour estimate of 1,800. These refinements resulted in a realization rate of 77%.
- Project 304 (Lighting – Low Bay and Linear LED Tubes). The ex post savings were lower than ex ante due to the application of an Indiana TRM-based savings factor (0.37) for

occupancy sensors with high-end trim. Additionally, the ex post evaluation found inconsistencies in the ex ante savings assumptions for low bay and T8 tube replacements, which could not be replicated. These adjustments resulted in a realization rate of 67%.

Table 4-5 presents the ex post annual gross kWh savings for the Work Direct Install Program from January 2024 through December 2024.

Table 4-5 Ex Post Annual Gross kWh

Ex Ante Gross kWh Savings	*Gross Audited kWh Savings*	*Gross Verified kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
515,245	515,245	515,245	377,941	73%

4.3.2.2. Ex Post Gross kW Reductions

Table 4-6 presents the ex post peak kW reduction for the Work Direct Install Program from January 2024 through December 2024.

Table 4-6 Ex Post Peak kW Reduction

Ex Ante Gross kW Savings	*Gross Audited kW Savings*	*Gross Verified kW Savings*	*Ex Post Gross kW Savings*	*Gross Realization Rate*
4.96	4.96	4.96	54.43	1097%

4.4. Estimation of Ex Post Net Savings

4.4.1. Methodology for Estimating Ex Post Net Savings

The procedure for the estimation of net program-level kWh energy savings and program-level kW demand reductions was the same as the approach described in Section 2.4 of this document on page 16.

4.4.2. Results of Ex Post Net Savings Estimation

Table 3-6 summarizes the net ex post kWh savings and the net ex post kW demand reduction of the Work Direct Install Program.

Table 4-7 Ex Post Net kWh and kW Savings

Category	*kWh*	*kW*
Ex Ante Gross Savings	515,245	4.96
Gross Audited Savings	515,245	4.96
Gross Verified Savings	515,245	4.96
Ex Post Gross Savings	377,941	54.43
Gross Realization Rate	73%	1097%
Ex Post Free Ridership	9,754	0.21
Ex Post Non-Participant Spillover	0	-
Ex Post Participant Spillover	0	-
Ex Post Net Savings	368,187	54.22
Net-to-Gross Ratio	97%	100%
Ex Post Net Lifetime Savings	5,268,756	N/A

4.5. Process Evaluation

ADM completed a process evaluation of the PY2024 program. The following research activities informed the process evaluation.

- Interviews and discussions with program staff.
- Review of program documents and tracking data.

4.5.1. Process Evaluation Findings

ADM interviewed program staff and completed a survey of program participants. The interviews with program staff provided information on how the program was implemented in 2024, changes made since 2023, and key successes and challenges. The survey of program participants focused on collecting data to support the estimation of net savings and no additional findings are presented for the process evaluation.

4.5.1.1. Program and Operations

In Indiana, the 2023 relaunch of the SBDI program aimed to achieve increased energy savings goals for the state's three-year filing period. While initial efforts prioritized custom and prescriptive programs, the SBDI program later gained focus. Despite a slow start in 2024, discussions have been ongoing to increase program participation. Consideration was given to a new implementation approach with CLEAResult directly managing projects; however, the decision was made to continue using the existing trade ally network. The program remains committed to leveraging this structure to accelerate project implementation and meet targets.

The outreach specialist has concentrated efforts on engaging small businesses through email communications. Beyond these emails, there have been no additional initiatives reported. Current efforts are focused on determining next steps and planning future initiatives.

Participation did increase in the program from PY2023. The ex ante savings increased by 270%.

Table 4-8 Comparison of PY2023 and PY2024 Participation

Ex Ante Savings	
PY2023	*PY2024*
138,952	515,245

4.5.1.2. Participant Survey Results

Three participants completed the SBDI online survey. Two had prior I&M project experience, one did not. Two found out about incentives online, one through a trade ally. One SBDI participant received an onsite evaluation and implemented all recommended measures.

All would recommend their contractor and agreed that recommendations were sensible, and their trade ally could answer program questions. Installation wait times varied: 33% waited 1–2 weeks, 33% over six weeks, and 33% did not know. One purchased energy-efficient equipment with an incentive, while two made no significant purchases. Evaluation methods were evenly split between initial cost and life cycle cost.

All respondents were very satisfied with staff responsiveness, installed equipment, installation quality, and overall program. Two-thirds were very satisfied with installation timelines. All were satisfied with how well trade allies explained the program rules and processes.

4.6. Findings and Recommendations

Work Direct Install participation increased during PY2024. The number of projects increased by 44% and savings increased 270%.

Participant satisfaction was high. All respondents were very satisfied with staff responsiveness, installed equipment, installation quality, and the overall program. Two-thirds were very satisfied with installation timelines. All respondents were satisfied with how well trade allies explained program rules and processes.

The realization rate varied across sampled projects due to differences in fixture types, wattages, and operating hours compared to prescriptive assumptions. For Sample ID 302, the lower realization rate (43%) was attributed to differences in fixture specifications and reduced operating hours in the industrial area compared to the ex ante assumptions.

For Sample ID 303, exterior canopy light fixtures operated for fewer hours than assumed in the prescriptive savings model, leading to a realization rate of 61%. However, the same sample also showed a 157% realization rate for interior LED tube replacements, as their operating hours were based on store open hours, which exceeded the prescriptive assumptions. For Sample ID 305, the exterior canopy lights also operated for fewer hours than assumed, resulting in a realization rate of 67%. For Sample ID 302, the lower realization rate (43%) was attributed to differences in fixture specifications and reduced operating hours in the industrial area compared to the ex ante assumptions.

- Recommendation 1: ADM recommends verifying hours of operation for external lighting since two sampled sites had lighting that operated from dusk to business close rather than a longer period.

5. Work Strategic Energy Management

This chapter presents the results of both the impact and process evaluations of the Work Strategic Energy Management that Indiana Michigan Power (I&M) offered to its non-residential customers during the period of January 2024 through December 2024.

The objectives of the evaluation are to:

- Assess gross and net energy (kWh) savings and peak demand (kW) reductions resulting from participation in the program during the program year;
- Complete a process evaluation of the program; and
- Provide recommendations for program improvement as appropriate.

5.1. Program Description

The Work SEM Program provides a systematic approach to energy management within a commercial or industrial facility and is similar in concept to continual change practices and standards for business quality improvement, safety improvement, etc. SEM viability depends upon participating customer adoption and use of three elements:

1. Demonstrated commitment through policies, goals, and allocation of resources;

2. Demonstrated energy management planning and implementation; and

3. Implementing and using a system for measuring and reporting performance.

Accordingly, the Work SEM Program provides rebates, training, and energy savings identification and verification. Training rebates will provide for Building Operator Certification (BOC) training on a per-participant basis. Behavioral energy savings will be evaluated according to building type for those participating in the training.

SEM will also pay rebates based on a whole building assessment for energy savings, dependent upon the building type.

5.2. Data Collection

5.2.1. Verification of Measures

5.2.1.1. Sampling Plan

ADM used a stratified sampling approach to develop the M&V sample. A stratified sampling approach allowed for a given statistical precision and confidence level target to be met with a smaller sample size than would have been allowed by simple random sampling. Strata boundaries were based on ex ante kWh energy savings. ADM selected a sample with enough sample units to facilitate estimation of program ex post kWh energy savings with 10% statistical precision at a 90% confidence level.

The table below shows the number of projects, ex ante gross kWh energy savings, and sampling statistics, by stratum, of the program sample.

Table 5-1 Population Statistics Used for Work Strategic Energy Management Sample Design

Variable	*Stratum 1*	*Stratum 2*	*Stratum 3*	*Totals*
Strata boundaries (kWh)	> 1000000	200000 - 1000000	< 1000000	
Number of projects	1	4	5	10
Total Ex Ante Annual kWh	1,557,181	1,457,382	542,666	3,557,229
Average kWh Savings	1,557,181	364,346	108,533	2,030,060
Std. dev. of kWh savings	N/A	47,808	63,480	111,288
Coefficient of variation	N/A	0.13	0.58	
Final design sample	1	2	2	5

5.2.1.2. Verification Data Collection Procedures

In general, the data collection procedure for the Work SEM was the same as the approach described in Section 2.2 of this document on page 8. ADM used data collected by program implementers on the measures implemented through the program and other site-specific information on product schedules and trends in energy consumption. ADM will request the implementers statistical models used to estimate energy savings.

ADM supplemented data collected by the program with the collection of additional site-specific data on measures implemented, production changes and operating schedules, building automation system trend logs through telephone conversations and email exchanges with the site contact.

5.3. Estimation of Ex Post Gross Savings

5.3.1. Methodology for Estimating Ex Post Gross Savings

5.3.1.1. Review of Documentation

I&M's program implementation contractor provided documentation for the sampled energy efficiency projects undertaken at customer facilities. ADM's first step in the evaluation effort was to review this documentation and other program materials that were relevant to the evaluation effort.

5.3.1.2. Procedures for Estimating Measure-Level Gross Energy Savings

All sampled measures for the Work Strategic Energy Management Program were characterized as SEM upgrades. The savings were evaluated using an IPMVP Option C: Whole Facility Model approach.

ADM calculated a kWh energy savings gross realization rate and a peak kW reduction gross realization rate for the M&V sample. The site-level gross impact analysis results for the M&V sample site are presented in Volume II of the report.

5.3.2. Results of Ex Post Gross Savings Estimations

The kWh gross realization rate is the ratio of sampled measure ex post gross kWh energy savings to sampled measure ex ante kWh energy savings. The kW gross realization rate is the ratio of sampled measure ex post gross kW demand savings to sampled measure ex ante kW demand savings. Since a stratified sampling approach was employed for this program, stratum-level kWh and kW gross realization rates were developed for each sampling stratum.

Program-level gross ex post gross kWh energy savings are calculated as follows:

- The ex-ante kWh energy savings of non-sampled measures are factored by the applicable stratum-level kWh gross realization rates to calculate ex post gross kWh energy savings for non-sampled measures.
- The ex post gross kWh energy savings of all sampled measures and all non-sampled measures are summed.

Program-level gross ex post gross kW demand savings are calculated as follows:

- The ex-ante kW demand savings of non-sampled measures are factored by the applicable stratum-level kW gross realization rates to calculate ex post gross kW savings for non-sampled measures.
- The ex post gross kW demand savings of all sampled measures and all non-sampled measures are summed.

5.3.2.1. Ex Post Gross kWh Savings

Table 5-5 displays the ex ante and ex post gross kWh savings of the Work Strategic Energy Management Program including gross realization rates for sampled projects.

Table 5-2 Work Direct Install Project-Level Ex Ante and Ex Post kWh Savings

Stratum	*Project Number*	*Measure*	*Ex Ante kWh Savings*	*Gross Ex Post kWh Savings*	*Project Gross Realization Rate*
1	400	Custom SEM	1,557,181	665,602	43%
2	401	Custom SEM	430,719	271,022	63%
2	402	Custom SEM	317,346	293,951	93%
3	403	Custom SEM	165,522	181,714	110%
3	404	Custom SEM	9,979	9,979	100%
All Non-Sample Projects			1,076,482	936,749	87%
Total			3,557,229	2,359,017	66%

Factors contributing to the realization rate discrepancies included the following:

- Project 400 (43%): The waste heat reduction did not result in savings because ADM did not consider the change in waste heat as a reliable proxy for the change in input energy. While the new full convection technology reduced the surface temperature of the

equipment, waste heat exits through multiple pathways (conduction, convection, and radiation), making it difficult to directly link waste heat reduction to energy savings. ADM found that estimating energy savings based on surface temperature reduction introduced high uncertainty, so they did not validate the ex ante savings estimate of 891,579 kWh.

- Project 401 (63%): ADM identified air leak repair capital improvement savings that were not removed from model estimate of the savings in the ex ante savings analysis. Removing these savings that occurred during the reported period accounted for the difference in ex post and ex ante savings.

Table 5-3 displays the ex ante and ex post gross kWh savings of the Work SEM Program including gross realization rate.

Table 5-3 Ex Post Annual Gross kWh

Ex Ante Gross kWh Savings	*Gross Audited kWh Savings*	*Gross Verified kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
3,557,229	3,557,229	3,557,229	2,359,017	66%

5.3.2.2. Ex Post Gross kW Reductions

Table 5-4 presents the ex post peak kW reduction for the Work SEM Program from January 2024 through December 2024.

Table 5-4 Ex Post Peak kW Reduction

Ex Ante Gross kW Savings	*Gross Audited kW Savings*	*Gross Verified kW Savings*	*Ex Post Gross kW Savings*	*Gross Realization Rate*
-	-	-	292.27	N/A

5.4. Estimation of Ex Post Net Savings

5.4.1. Methodology for Estimating Ex Post Net Savings

The net savings analysis was used to determine what part of the gross energy savings achieved by program participants could be attributed to the effects of the program. The net savings attributed to program participants are the gross savings less free ridership, plus spillover.

ADM completed interviews with participants in PY2023 and determined that the net-to-gross ration for the program was 100%. We applied this net-to-gross ratio to the PY2024 projects.

5.4.2. Results of Ex Post Net Savings Estimation

Table 5-5 summarizes the net ex post kWh savings and the net ex post kW demand reduction of the Work SEM Program.

Table 5-5 Ex Post Net kWh and kW Savings

Category	*kWh*	*kW*
Ex Ante Gross Savings	3,557,229	-
Gross Audited Savings	3,557,229	-
Gross Verified Savings	3,557,229	-
Ex Post Gross Savings	2,359,017	292.27
Gross Realization Rate	66%	N/A
Ex Post Free Ridership	0	-
Ex Post Non-Participant Spillover	0	-
Ex Post Participant Spillover	0	-
Ex Post Net Savings	2,359,017	292.27
Net-to-Gross Ratio	100%	100%
Ex Post Net Lifetime Savings	15,792,759	N/A

5.5. Process Evaluation

ADM completed a process evaluation of the PY2024 program. The following research activities informed the process evaluation.

- Interviews and discussions with program staff.
- Review of program and project documentation.
- Interviews with program participants.

The objectives of the process evaluation were to:

- Understand and characterize the SEM program in terms of objectives, intended market, customer recruitment processes, participation process, and processes for assessing and reporting savings estimates.
- Obtain feedback from participants on the program.
- Identify opportunities for program improvement where applicable.

5.5.1. Process Evaluation Findings

5.5.1.1. Program Design and Operations

The SEM program is designed to drive energy efficiency initiatives within the commercial and industrial sectors. It operates as a comprehensive, hands-on model that emphasizes frequent interactions and collaborative meetings between program staff and participants. To motivate engagement, the SEM program provides financial incentives, offering 2 cents per kWh saved, which are typically distributed at the conclusion of the program year. Additionally, if participants

qualify for a higher incentive through a custom or prescriptive program for equipment upgrades, they are eligible to receive those enhanced incentives. The SEM program is a tool in promoting sustained energy efficiency practices and driving meaningful savings across Indiana businesses.

In 2024, the SEM program maintained its momentum without undergoing significant changes, as evidenced by the nearly 10-fold increase in ex ante energy savings in PY2024 (Table 5-6). I&M program staff indicated that energy champions within businesses continued to be engaged in energy-saving initiatives. This engagement has been particularly impactful, with one major manufacturing company rejoining the program and contributing to its ongoing success.

Table 5-6 Summary of Energy Savings

Ex Ante Savings	
PY2023	*PY2024*
394,618	3,557,229

5.6. Findings and Recommendations

Program savings increased significantly in PY2024. The program saw a nearly 10-fold increase in energy savings in PY2024.

The evaluation findings indicate discrepancies in the treatment of capital project savings, which contributed to differences between ex ante and ex post savings estimates. For Sample ID 401, air leak repair savings were not properly excluded from the ex ante model, leading to an overstatement of savings. The evaluation team corrected this by removing the savings associated with air leak repairs conducted during the reporting period, aligning the ex post estimate with actual implementation timing. For Sample ID 402, while two of the three capital improvement projects were correctly removed from the modeled savings, one project was mistakenly retained, impacting the final savings estimate.

- **Recommendation 1: Perform additional QC of the handling of capital improvement project savings to be excluded from the SEM modeled savings estimates.**

6. Cost Effectiveness Evaluation

The following cost effectiveness tests were performed for each program: Total Resource Cost (TRC) test, Utility Cost Test (UCT), Participant Cost Test (PCT), and Ratepayer Impact Measure (RIM) test. A score above one signifies that, from the perspective of the test, the program benefits were greater than the program costs. The benefits and costs associated with each test are defined in Table 6-1.

Table 6-1 Summary of Benefits and Costs Included in each Cost Effectiveness Test

Variable	*Definition*	*PCT*		*UCT*		*RIM*		*TRC*	
		Benefit	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*
Incentives	Incentives paid to customers.	✓			✓		✓		
Program Installation Costs	Installation costs paid by program.				✓		✓		✓
Bill Savings /Lost Revenue	Reduction in electricity costs faced by customers as a result of implementation of program measures. Equal to revenue lost to the utility.	✓					✓		
Avoided Energy Costs	Energy-related costs avoided by utility.			✓		✓		✓	
Avoided Capacity Costs	Capacity-related costs avoided by utility, including T&D.			✓		✓		✓	
Incremental Costs	Incremental costs associated with measure implementation, as compared with what would have been done in absence of program.		✓						✓
Program Overhead Costs	Program costs other than incentive or installation costs.				✓		✓		✓

6.1. PY2024 Cost Effectiveness Evaluation

Table 6-2 through Table 6-5 summarize key financial benefit and cost inputs for the various tests along as well as the test results for each commercial and industrial program during PY2024.

Table 6-2 Work Prescriptive Program Cost Test Inputs and Results

Variable	*PCT*		*UCT*		*RIM*		*TRC*	
	Benefit	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*
Incentives	$ 1,895,697			$ 1,895,697		$ 1,895,697		
Program Installation Costs				$ -		$ -		$ -
Bill Savings (NPV)	$15,279,058							
Lost Revenue (NPV)						$22,334,830		
Avoided Energy Costs (NPV)			$ 8,449,337		$ 8,449,337		$ 8,449,337	
Avoided Capacity Costs (NPV)			$ 2,726,857		$ 2,726,857		$ 2,726,857	
Avoided T&D Costs (NPV)			$ 725,166		$ 725,166		$ 725,166	
Incremental Costs		$ 3,650,210						$ 3,650,210
Program Overhead Costs				$ 2,125,014		$ 2,125,014		$ 2,125,014
Total Benefits	$ 17,174,755		$ 11,901,360		$ 11,901,360		$ 11,901,360	
Total Costs	$ 3,650,210		$ 4,020,711		$ 26,355,541		$ 5,775,223	
Test Score	4.71		2.96		0.45		2.06	

Table 6-3 Work Custom Program Cost Test Inputs and Results

Variable	*PCT*		*UCT*		*RIM*		*TRC*	
	Benefit	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*
Incentives	$ 2,205,568			$ 2,205,568		$ 2,205,568		
Program Installation Costs				$ -		$ -		$ -
Bill Savings (NPV)	$ 9,805,226							
Lost Revenue (NPV)						$12,112,948		
Avoided Energy Costs (NPV)			$ 4,178,866		$ 4,178,866		$ 4,178,866	
Avoided Capacity Costs (NPV)			$ 1,524,275		$ 1,524,275		$ 1,524,275	
Avoided T&D Costs (NPV)			$ 485,226		$ 485,226		$ 485,226	
Incremental Costs		$ 3,166,221						$ 3,166,221
Program Overhead Costs				$ 2,696,617		$ 2,696,617		$ 2,696,617
Total Benefits	$ 12,010,794		$ 6,188,367		$ 6,188,367		$ 6,188,367	
Total Costs	$ 3,166,221		$ 4,902,185		$ 17,015,132		$ 5,862,838	
Test Score	3.79		1.26		0.36		1.06	

Table 6-4 Work Direct Install Program Cost Test Inputs and Results

Variable	*PCT*		*UCT*		*RIM*		*TRC*	
	Benefit	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*
Incentives	$ 131,672			$ 131,672		$ 131,672		
Program Installation Costs				$ -		$ -		$ -
Bill Savings (NPV)	$ 232,061							
Lost Revenue (NPV)						$ 338,254		
Avoided Energy Costs (NPV)			$ 127,968		$ 127,968		$ 127,968	
Avoided Capacity Costs (NPV)			$ 39,575		$ 39,575		$ 39,575	
Avoided T&D Costs (NPV)			$ 10,522		$ 10,522		$ 10,522	
Incremental Costs		$ 53,363						$ 53,363
Program Overhead Costs				$ 242,572		$ 242,572		$ 242,572
Total Benefits	$ 363,733		$ 178,065		$ 178,065		$ 178,065	
Total Costs	$ 53,363		$ 374,244		$ 712,498		$ 295,935	
Test Score	6.82		0.48		0.25		0.60	

Table 6-5 Work Strategic Energy Management Program Cost Test Inputs and Results

Variable	*PCT*		*UCT*		*RIM*		*TRC*	
	Benefit	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*	*Benefit*	*Cost*
Incentives	$ 17,943			$ 17,943		$ 17,943		
Program Installation Costs				$ -		$ -		$ -
Bill Savings (NPV)	$ 746,926							
Lost Revenue (NPV)						$ 1,043,060		
Avoided Energy Costs (NPV)			$ 385,971		$ 385,971		$ 385,971	
Avoided Capacity Costs (NPV)			$ 93,495		$ 93,495		$ 93,495	
Avoided T&D Costs (NPV)			$ 26,129		$ 26,129		$ 26,129	
Incremental Costs		$ 298,553						$ 298,553
Program Overhead Costs				$ 522,900		$ 522,900		$ 522,900
Total Benefits	$ 764,869		$ 505,595		$ 505,595		$ 505,595	
Total Costs	$ 298,553		$ 540,843		$ 1,583,904		$ 821,454	
Test Score	2.56		0.93		0.32		0.62	

2024 Indiana Commercial & Industrial Portfolio EM&V Report

Volume II of II

Prepared for:
Indiana Michigan Power

April 2025

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Table of Contents

1. Introduction

Under contract with the Indiana Michigan Power (I&M), ADM Associates, Inc., (ADM) performed evaluation, measurement and verification (EM&V) activities to confirm the energy savings (kWh) and demand reduction (kW) realized through the demand side management programs that I&M implemented in Indiana in 2024.

This report is divided into two volumes providing information on the impact, process, and cost-effectiveness evaluation of the I&M portfolio of commercial and industrial programs implemented in Indiana during the 2024 program year. Volume II contains chapters presenting detailed information regarding evaluation methodologies, data collection instruments, and evaluation results. Volume II is organized as follows:

- Chapter 2: Site-Level Estimation of Ex Post Gross Energy Impacts
- Chapter 3: C&I Participant Survey Instrument
- Chapter 4: C&I Participant Survey Results

See report Volume I for narrative and summary information pertaining to the evaluation methods and results.

2. Site-Level Estimation of Ex Post Gross Energy Impacts

Facility Occupied Annual Hours

Interval billing data, weather data, time of day and day of week data are variables for the following linear regression equation.

$$\begin{aligned} \mathrm{kWh_{hour}} = {} & \beta_0 + \beta_{\mathrm{CDH}} \mathrm{x\ CDH} + \beta_{\mathrm{HDH}} \mathrm{x\ HDH} \\ & + \beta_{\mathrm{Weekday\ x\ Hour1\_flag}} \mathrm{x\ WeekdayFlag\ x\ Hour1\_Flag} \\ & + \ldots \\ & + \beta_{Weekday\ x\ Hour24\_flag}\ x\ WeekdayFlagx\ Hour24\_Flag \\ & + \beta_{Weekend\ x\ Hour1_{flag}}\ x\ WeekendFlag\ x\ Hour1\_Flag \\ & + \ldots \\ & + \beta_{Weekend\ x\ Hour24_{flag}}\ x\ WeekendFlag\ x\ Hour24\_Flag \end{aligned}$$

Where:

β_0 =Y-Intercept

β_{CDH} =Coefficient for the variable CDH, cooling degree hour

CDH =Cooling degree hour

β_{HDH} =Coefficient for the variable HDH, heating degree hour

HDH =Heating degree hour

$\beta_{WeekdayxHour1\_Flag}$ =Coefficient for the interactive variable Weekday x Hour1_Flag

WeekdayFlag x Hour1_Flag=Interactive binary variable: WeekdayFlag x Hour1_Flag

…. =iteration of variables for hours 2 through 24 for weekdays

$\beta_{Weekend\ xHour1\_Flag}$ =Coefficient for the interactive variable Weekend x Hour1_Flag

WeekendFlag x Hour1_Flag=Interactive binary variable: WeekendFlag x Hour1_Flag

…. =iteration of variables for hours 2 through 24 for weekends

The significance of the CDH, HDH coefficients are optimized by iterating through balance point temperatures, the approximated outdoor air temperature where building heating and cooling switchover. The coefficient and variable for CDH and HDH are set to null to build a hourly model for a 1 week period, to reflect base load energy usage, without the energy required for heating and cooling. Breakpoint points are visually identified in the model, for the transition to unoccupied and occupied periods. Hourly energy usage in transition from occupied to unoccupied may also be proportioned to load, along with time.

2.1. Sample ID 100, Sample ID 104

Executive Summary

Under a projects represented by sample ID 100 and ID 104; a program participant received prescriptive incentives from I&M for replacing standard flow blow off air nozzles with low flow air nozzles in two manufacturing buildings.

The ex post energy savings are 1,028,160 kWh, peak demand savings are 206.71 kW, with an energy savings realization rate of 56%.

Project Description

The participant replaced continuous air blow off nozzles in their processing line with (102) 1/4" diameter low flow nozzles to reduce the load on the air compressors.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the installation verification and pictures of the installed nozzle. As the base case nozzle flow was not known, the methodology from the TRM was referenced, with an inference made on the base flow as twice the flow of the efficient nozzle from the TRM narrative.

$$kWh_{savings} = QTY\ x(CFM_{baseflow}\text{-}CFM_{lowflow})\ x\ kW/CFM\ x\ Hours$$

$$kW_{savings} = kWh_{savings}\ x\ CDF$$

Where:

$kWh_{savings}$	= Annual energy savings
QTY	=Quantity nozzles placed in service
$CFM_{baseflow}$	= Base case, air flow, CFM
$CFM_{lowflow}$	= Efficient nozzle air flow, CFM,
$Hours$	= Annual hours of use
kW/CFM	= kW/CFM plant air compressor
CDF	= Coincidence Factor for Peak Demand hours, 0.000201053

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and the TRM provided air compressor power efficiency. Two nozzle sizes were replaced for this project, 0.125" (1/8) and 0.250 (1/4).

Low Flow Air Nozzle Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*	*Ex Post Source*
$CFM_{low\ flow\ 1/8}$	6	13	Manufacturer specification
$CFM_{low\ flow\ 1/4}$	24	14	Manufacturer specification
$CFM_{standard\ flow\ 1/8}$	17	26	TRM (1/50% reduction)
$CFM_{standard\ flow\ 1/4}$	68	28	TRM (1/50% reduction)
Compressed air efficiency, kW/CFM	0.16	0.18	TRM: VFD compressor
Hours	4,000	4,000	Site
$kWh_{savings}$ 1/8”	4,510	9,360	Calculated
$kWh_{savings}$ 1/4”	18,041	10,080	Calculated
CDF factor	0.000201053	0.000201053	Indiana TRM

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Air nozzles, Sample ID 100	1,262,914	705,600	56%	141.863
Air nozzles, Sample ID 104	577,332	322,560	56%	64.852
Total	1,840,246	1,028,160	56%	206.71

The ex post energy savings are 1,028,160 kWh, peak demand savings are 206.71 kW, with an energy savings realization rate of 56%.

The ex post savings method referenced the Indiana TRM which narrated a 50% reduction in air flow with efficient nozzles. The base flow was determined as the known flow by the manufacturer specification sheet and the product of 1/50%. The ex post

2.2. Sample ID 101

Executive Summary

Under a project represented by sample ID 101, a program participant received prescriptive incentives from I&M for replacing fluorescent and HID fixtures with LED tubes and fixtures, in the office areas, warehouse space and building exterior.

The ex post annual energy savings are 706,822 kWh, with an ex post peak demand reduction of 100.300 kW. The project energy savings gross realization rate is 95%.

Project Description

The participant replaced (484) high bay fixtures with LED fixtures and fixture mounted occupancy sensors, (118) exterior HID wall packs with LED wall packs, (81) 2x5 T8 fluorescent fixtures with LED panels,(54) T8 fluorescent lamps with LED tubes, (44) low bay fixtures with LED fixtures and (24) CFL downlights with LED.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
CFL downlight to LED	24	24	48	12	4,000	1.00	3,396	3,456	102%
T8 Flo to LED tube	54	54	32	10.5	4,000	1.00	4,428	4,644	105%
T8Troffer Flo to LED panel	81	81	76	49	4,000	1.00	9,032	8,748	97%
HID low bay to LED low bay	44	44	157	40.4	6,000	1.08	36,115	33,245	92%
HID exterior wallpack to LED	118	118	258	80	4,303	1.00	74,044	90,380	122%
No controls to high bay occupancy sensors	484	484	154	154	8,760	1.08	221,188	169,241	77%
HID/T8 Flo to LED high bay	484	484	392	154	4,200	1.08	397,267	397,108	100%
Total							745,470	706,822	95%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive	745,470	706,822	95%	100.30
Total	745,470	706,822	95%	100.30

The ex post annual energy savings are 706,822 kWh, with an ex post peak demand reduction of 100.300 kW. The project energy savings gross realization rate is 95%.

The ex post savings for the occupancy sensors are based on the 8,760 hours indicated from the AMI interval data, the new fixture wattages and the TRM savings factor. The ex ante prescriptive savings per unit may be based on additional controlled wattage.

2.3. Sample ID 102, Sample ID 116, Sample ID 220, Sample ID 301

Executive Summary

Under a project represented by sample ID 102, ID 116, ID 220, ID 301 , a program participant received prescriptive, custom and SBDI incentives from I&M for replacing lighting throughout the office area and warehouse area.

The ex post annual energy savings are 751,564 kWh, with an ex post peak demand reduction of 109.16 kW. The project energy savings gross realization rate is 94%.

Project Description

The participant replaced linear fluorescent lamps with LED tubes (1334), CFL recessed fixtures with LED recessed fixtures (78), high bay linear fluorescent fixtures with LED fixtures (1150), which included 250 occupancy sensors in the warehouse area.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
CFL to LED recessed fixture	1	1	65	29	3,649	1.00	155	131	85%
T5,and T8 to LED tubes and fixtures	1	1	6600	3500	3,649	1.00	10,201	11,312	111%
CFL to LED recessed fixture	78	78	64	22	3,649	1.00	11,037	11,954	108%
T5 and T8 Flo to LED tubs	200	200	64	38	3,649	1.00	20,096	18,975	94%
T8HO fixtures to LED fixtures	23	23	458	145	3,649	1.00	31,737	26,269	83%
T8HO to LED tubes	1134	1134	64	40	3,649	1.00	85,233	99,311	117%
No controls occ sensor with dimming	250	250	175	175	3,649	1.00	114,250	59,068	52%
T5 Flo high bay to LED high bay	1150	1150	300	175	3,649	1.00	525,550	524,544	100%
Total							798,259	751,564	94%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive102	642,071	654,915	102%	93.73
Lighting Prescriptive116	31,737	26,269	83%	4.14
Lighting Custom 220	10,201	11,312	111%	1.97
Lighting SBDI 301	114,250	59,068	52%	9.32
Total	798,259	751,564	94%	109.16

The ex post annual energy savings are 751,564 kWh, with an ex post peak demand reduction of 109.16 kW. The project energy savings gross realization rate is 94%.

The ex post savings for the high bay fixture mounted occupancy sensors referenced the installed fixture wattages, the hours of use and a TRM based savings factor for occupancy sensor with high end trim (dimming).

2.4. Sample ID 103, Sample ID 111

Executive Summary

Under a projects represented by sample ID 103 and ID 111, a program participant received prescriptive incentives from I&M for replacing standard flow blow off air nozzles with low flow air nozzles in a manufacturing building.

The ex post energy savings are 434,480 , peak demand savings are 87.434 kW, with an energy savings realization rate of 63%.

Project Description

The participant replaced continuous air blow off nozzles in their processing line with (12) 1/8" diameter low flow nozzles and (32) ¼" low flow nozzles.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the installation log and pictures of the installed nozzle. As the base case nozzle flow was not known, the methodology from the TRM was referenced, with an inference made on the base flow as twice the flow of the efficient nozzle from the TRM narrative.

$$kWh_{savings} = QTY\ x(SCFM_{baseflow}\text{-}SCFM_{lowflow})\ x\ kW/CFM\ x\ Hours$$

$$kW_{savings} = kWh_{savings}\ x\ CDF$$

Where:

$kWh_{savings}$	*= Annual energy savings*
QTY	*=Quantity nozzles placed in service*
$SCFM_{baseflow}$	*= Base case, air flow, CFM*
$SCFM_{lowflow}$	*= Efficient nozzle air flow, CFM,*
Hours	*= Annual hours of use*
kW/CFM	*= kW/CFM plant air compressor*
CDF	*= Coincidence Factor for Peak Demand hours, 0.000201053*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and the compressor power efficiency.

Low Flow Air Nozzle Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*	*Ex Post Source*
$CFM_{low\ flow\ 1/8}$	6	13	Manufacturer specification
$CFM_{low\ flow\ 1/4}$	24	14	Manufacturer specification
$CFMsta_{standardflow\ 1/8}$	17	26	TRM 1/50% reduction
$CFM_{standardflow\ 1/4}$	68	28	TRM 1/50% reduction
Compressed air efficiency, kW/CFM	0.16	0.18	TRM: VFD compressor
Hours	4,000	4,000	Site
$kWh_{savings}$ 1/8”	4,510	9,360	Calculated
kWhsavings 1/4”	18,041	10,080	Calculated
CDF factor	0.000201053	0.000201053	Indiana TRM

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Air nozzles, Sample ID 111	115,050	112,320	98%	22.582
Air nozzles, Sample ID 103	577,344	322,560	56%	64.852
Total	692,364	434,880	63%	87.434

The participant replaced continuous air blow off nozzles in their processing line with (12) 1/8” diameter low flow nozzles and (32) ¼” low flow nozzles.

The ex post savings method referenced the TRM which narrated a 50% reduction in air flow with efficient nozzles. The base flow was determined as the known flow by the manufacturer specification sheet x 1/50%.

2.5. Sample ID 107

Executive Summary

Under a project represented by sample ID 107 , a program participant received prescriptive incentives from I&M for replacing lighting throughout the office area and manufacturing area.

The ex post annual energy savings are 189,269 kWh, with an ex post peak demand reduction of 29.242 kW. The project energy savings gross realization rate is 61%.

Project Description

The participant replaced linear fluorescent lamps with LED tubes (375), 2x4 fluorescent fixtures with LED panel fixtures (54), high bay linear fluorescent fixtures with LED fixtures (325), and fluorescent strip fixtures with LED strip fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
4L T8 Flo to LED panel	54	54	56	36	2,600	1.14	6,021	3,201	53%
T8 Flo strip to LED strip	20	20	111	37	2,600	1.14	9,612	4,387	46%
T8 Flo lamps to LED tubes	375	375	37	12.5	2,600	1.14	30,065	27,047	90%
4L & 6L T8 to LED high bay	325	325	306	123	2,600	1.00	266,760	154,635	58%
Total							312,458	189,269	61%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive	312,458	189,269	61%	29.24
Total	312,458	189,269	61%	29.24

The ex post annual energy savings are 189,269 kWh, with an ex post peak demand reduction of 29.242 kW. The project energy savings gross realization rate is 61%.

- The ex post hours of use(2,600) informed by the AMI interval data may be less than the hours used to develop the prescriptive measure savings for high bay fixtures.
- The ex post base wattage for the high bay was actually higher than the value on the application. The ex post utilized the site light survey which indicated 6 lamp and 8 lamp fixtures. The weighted average was listed for the ex post savings.

2.6. Sample ID 108

Executive Summary

Under a project represented by sample ID 108, a program participant received prescriptive incentives from I&M for replacing linear fluorescent lighting fixtures with LED lighting fixtures.

The ex post annual energy savings are 112,562 kWh, with an ex post peak demand reduction of 8.52 kW. The project energy savings gross realization rate is 105%.

Project Description

The participant replaced (32) T8 linear fluorescent fixtures with LED strip fixtures and replaced (212) 4 lamp linear fluorescent fixtures with LED panel lighting fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated in one hour periods, binned to the day of the week, to estimate the working schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the measure: *LED Bulbs and Fixtures, Indiana Technical Reference Manual workbook 1.0.*

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

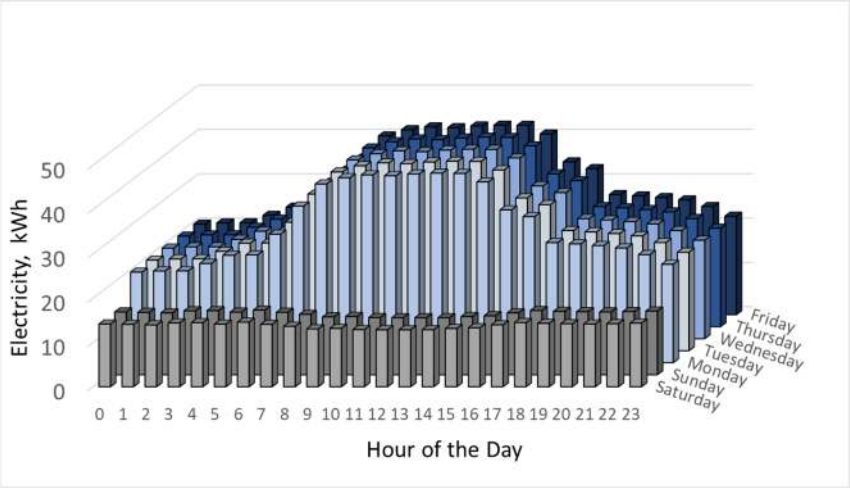
Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

measure type

AMI interval metering data, weather data, day of the week, and hour of the day data were linearly regressed to build a model that ultimately excludes the weather dependent energy usage, such as HVAC equipment. The model is presented in the following figure.

Energy Usage by hour and day of the week



The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
4' 1L T5 to LED strip fixture	32	32	57	35.8	8,760	1.06	4,835	6,299	130%
4' 4L T8 to LED 2x4 panel	212	212	112.6	35.55	6,137	1.06	101,887	106,263	104%
Total							106,722	112,562	105%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Prescriptive Lighting	106,722	112,562	105%	8.524
Total	106,722	112,562	105%	8.524

The ex post energy savings are 112,562 kWh with a gross energy savings realization rate of 105%. The primary difference in the realization rate is the ex post savings were informed by the 8760 hours of use for the strip lighting fixtures, whereas the ex ante deemed per unit savings were based on prototypical office hours.

2.7. Sample ID 109, Sample ID 223

Executive Summary

Under a project represented by sample ID 109 and ID 223, a program participant received prescriptive and custom incentives from I&M for replacing interior and exterior lighting with LED lighting in a retails store building.

The ex post annual energy savings are 210,024 kWh, with an ex post peak demand reduction of 31.078 kW. The total project energy savings gross realization rate is 98%.

Project Description

The participant replaced linear fluorescent lamps with LED 8’ lamps (9), and (1664) LED 4’ lamps. Also replaced was HID exterior parking pole mounted fixtures with LED fixtures (28).

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
8’ T8 Flo to LED tube	9	9	173	42	4,369	1.10	2,542	5,666	223%
HID pole fixture to LED	4	4	250	40	4,303	1.10	2,510	3,976	158%
HID pole fixture to LED	13	13	250	100	4,303	1.10	7,367	9,230	125%
HID pole fixture to LED	11	11	400	150	4,303	1.10	11,787	13,017	110%
4’ T8 Flo to LED tube	804	804	32	10.5	4,369	1.10	60,429	83,075	137%
4’ T5 Flo to LED tube	860	860	48	25	4,369	1.10	129,946	95,061	73%
Total							214,581	210,024	98%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Custom 223	2,542	5,666	223%	0.985
Lighting Prescriptive 109	212,039	204,358	96%	30.093
Total	214,851	210,024	98%	31.078

The ex post annual energy savings are 210,024 kWh, with an ex post peak demand reduction of 31.078 kW. The total project energy savings gross realization rate is 98%.

2.8. Sample ID 110

Executive Summary

Under a project represented by sample ID 110, a program participant received midstream prescriptive incentives from I&M for replacing HID high bay fixtures with LED fixtures in a manufacturing building.

The ex post annual energy savings are 51,333 kWh, with an ex post peak demand reduction of 8.1 kW. The project energy savings gross realization rate is 29%.

Project Description

The participant replaced (60) HID high bay fixtures with LED high bay fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

measure type

The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID to LED	60	60	458	160	2,871	1.00	176,683	51,333	29%
Total							176,683	51,333	29%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive Midstream	176,683	51,333	29%	8.10
Total	176,683	51,333	29%	8.10

The ex post annual energy savings are 51,333 kWh, with an ex post peak demand reduction of 8.1 kW. The project energy savings gross realization rate is 29%. The attributes for the ex ante savings per unit are not provided, but the ex post hours (2,871) are less than the TRM prototypical retail store building hours.

2.9. Sample ID 112

Executive Summary

Under a project represented by sample ID 112, a program participant received prescriptive incentives from I&M for replacing linear fluorescent lighting fixtures with LED lighting fixtures in a retail store.

The ex post annual energy savings are 69,031 kWh, with an ex post peak demand reduction of 13.28 kW. The project energy savings gross realization rate is 82%.

Project Description

The participant replaced (74) T8 linear fluorescent fixtures with LED troffer fixtures or kits and replaced (91) T8 6-lamp linear fluorescent fixtures with LED low bay fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

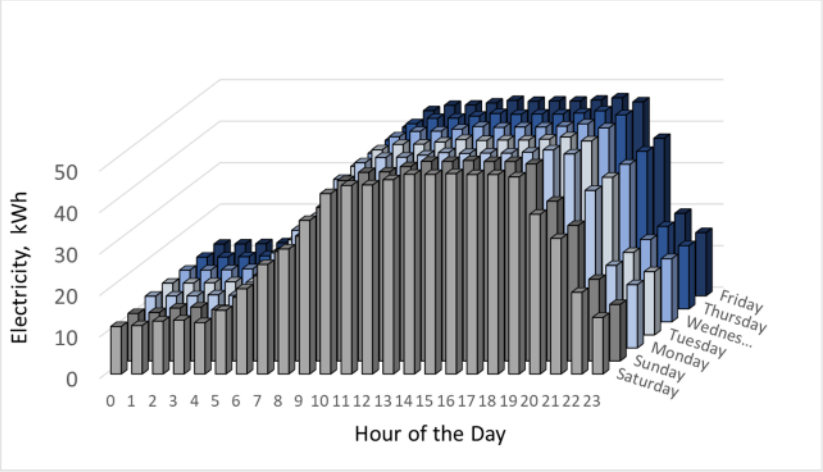
$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

AMI interval metering data, weather data, day of the week, and hour of the day data were linearly regressed to build a model that ultimately excludes the weather dependent energy usage, such as HVAC equipment. The model is presented in the following figure.

Energy Usage by hour and day of the week



The variables for the energy savings algorithm with the realized energy savings are summarized in the following table. The annual hours of use for the first two measures considered the energy load before the retail store opened for the office and support areas. Two annual holidays reduced the annualized lighting hours.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
2' 2L T8 to 2' LED Troffer	34	34	0	20.1	5,341	1.10	3,791	3,776	100%
4' 2L T8 to 2'x4' LED Troffer	40	40	0	34.1	4,900	1.10	6,208	6,015	97%
4’ 6L T8 to LED High Bay	91	91	222	111.2	5,341	1.10	74,693	59,241	79%
Total							84,692	69,031	82%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive	84,692	69,031	82%	13.280
Total	84,692	69,031	82%	13.280

The ex post energy savings are 69,031 kWh with a gross energy savings realization rate of 82%.

The primary difference in the realization rate is the ex post savings for the low bay lighting in a retail building were informed by the existing fixture wattage (222W), installed fixture wattage (111W) and hours (4719) annual hours of use. The ex ante deemed per unit measure savings is based on an industrial building hours and wattages for the measure “LED High Bay Fixture”.

2.10. Sample ID 113

Executive Summary

Under a project represented by sample ID 113, a program participant received prescriptive incentives from I&M for replacing T5 linear fluorescent fixtures with LED high bay fixtures and replacing HID exterior wall pack light fixtures with LED wall packs in a manufacturing facility

The ex post annual energy savings are 61,218 kWh, with an ex post peak demand reduction of 9.353 kW. The project energy savings gross realization rate is 76%.

Project Description

The customer replaced (94) six lamp T5 fixtures with LED high bay fixtures and (6) HID exterior wall packs with LED wall packs with dusk to dawn controls.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

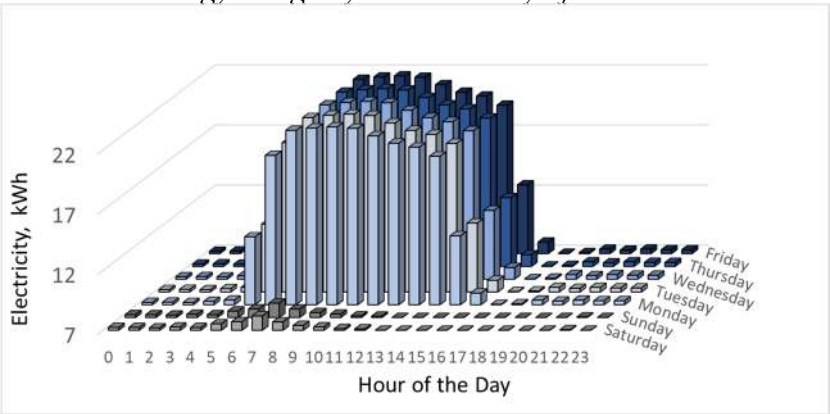
$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

AMI interval metering data, weather data, day of the week, and hour of the day data were linearly regressed to build a model that ultimately excludes the weather dependent energy usage, such as HVAC equipment. The model is presented in the following figure.

Energy Usage by hour and day of the week



The variables for the energy savings algorithm with the realized energy savings are summarized in the following table. The annual hours for the manufacturing facility include the full load from 6AM to 3PM, and the partial load before startup and after closing.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
4' 6L T5 to 2' LED troffer	94	94	392	174	2,805	1.00	77,155	57,480	74%
HID 250W to LED wallpack	6	6	198.9	54	4,300	1.00	3,400	3,738	110%
Total							80,555	61,218	76%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting	80,555	61,218	76%	9.353
Total	80,555	61,218	76%	9.353

The ex post energy savings are 61,218 kWh with a gross energy savings realization rate of 76%. The primary difference in the realization rate is the ex ante deemed per unit savings for the High Bay Lighting measure may be based on the prototypical TRM manufacturing building which is based on more than one shift. The ex post savings considered both the stated operating hours of 6 Am to 3PM plus the partial load exhibited in the energy model before the shift startup and after the end of the scheduled production shift. This operation was also verified with the site contact.

2.1. Sample ID 114

Executive Summary

Under a project represented by sample ID 114, a program participant received prescriptive incentives from I&M for replacing rooftop packaged air conditioning units with more efficient units that exceed the current federal efficiency standard for air cooled commercial packaged air conditioning units, at a retail building.

The ex post annual energy savings are 58,880 kWh, with an ex post peak demand reduction of 52.435 kW. The project energy savings gross realization rate is 116%.

Project Description

The customer replaced (22) rooftop air conditionings for a retail store with (22) units with SEER/IEER efficiency ranging from 19 to 22. The existing units at the end of their useful life, were considered normal replacement with the efficiency determined by the federal efficiency standards.

Measurement and Verification Effort

The variables for the energy savings algorithm are summarized in the following table.

Measure	*Qty*	*Capacity Tons*	*Efficiency Base*	*Efficiency Installed*	*Units*	*EFLH Cooling*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
PAC	3	14.3	14	19	IEER	1,185	10,130	15,325	151%
PAC	1	12.5	14	19	IEER	1,185	7,055	10,023	142%
PAC	8	9.5	14.6	21	IEER	1,185	13,939	22,559	162%
PAC	2	7.2	14.6	22	IEER	1,185	2,710	4,696	173%
PAC	1	5.8	14.6	23.3	IEER	1,185	1,162	2,091	180%
PAC	4	2.8	14	22	SEER1	1,185	11,754	3,139	27%
PAC	3	2.8	14	22	SEER1	1,185	3,918	1,046	27%
Total							50,669	58,880	116%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
HVAC	50,669	58,880	116%	52.435
Total	50,669	58,880	116%	52.435

The ex post savings are 58,880 kWh with a 116% realization rate. The (7) air conditioning units with capacities less than 65 KBTUh appear to have a deemed savings per ton that is overestimated for SEER 21 units. The large incremental increase from 191 kWh for SEER 18 to 1,306 kWh per ton for the SEER 21 does not align with the 3 SEER increase.

The following table summarizes the prescriptive programmed deemed energy savings per ton for air conditioning units with a SEER of 18 and 21. Where the two largest bins are similar with 181 to 194 kWh per ton savings, the smallest bin for units less than 65,000 BTUh has a deemed value of1,306 kWh that does not appear to align with other units.

Program Prescriptive Energy Savings, kWh

Prescriptive Measure	*SEER 18*	*SEER 21*
Unitary/Split AC <65,000 BTUH	191	1,306
Unitary/Split AC 65,000–135,000 BTUH	150	194
Unitary/Split AC 135,000–240,000 BTUH	125	181

2.2. Sample ID 115

Executive Summary

Under a project represented by sample ID 115, a program participant received prescriptive incentives from I&M for replacing existing LED linear tubes with more efficient LED linear tubes in a retail building.

The ex post annual energy savings are 25,433 kWh, with an ex post peak demand reduction of 3.5773 kW. The project energy savings gross realization rate is 67%.

Project Description

The participant replaced (485) T8 LED linear tubes with more efficient LED linear tubes and replaced (14) 2 lamp biax lamps with (14) 1L Led lamps.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

AMI interval metering data, weather data, day of the week, and hour of the day data were linearly regressed to build a model that ultimately excludes the weather dependent energy usage, with results that did not capture all meters in the facility and is not presented.

The variables for the energy savings algorithm with the realized energy savings are summarized in the following table. The annual hours of use were provided by the store with early stocking and closing included.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
3' T8 LED to T8 LED	1	1	16	8.5	5,293	1.10	82	44	53%
2L Biax to 4pin LED	14	14	40	16.5	4,745	1.10	842	1,717	204%
4' T8 to T8 LED	52	52	21	8.9	5,293	1.10	4,264	3,663	86%
4' T8 to LED & driver	432	432	21	13	5,293	1.10	35,424	20,120	57%
Total							40,612	25,544	63%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive	40,612	25,544	63%	3.573
Total	40,612	25,544	63%	3.573

The ex post energy savings are 25,544 kWh with a gross energy savings realization rate of 63%.

The expected savings for LED to LED linear tubes is relatively small per lamp, so any variance in the actual base wattage (18W) and the installed wattage (10.5 to 15) will result in variation of the realized energy savings.

2.3. Sample ID 117

Executive Summary

Under a project represented by sample ID 117, a program participant received midstream prescriptive incentives from I&M for replacing high bay lighting with LED high bay fixtures in a manufacturing building.

The ex post annual energy savings are 27,598 kWh, with an ex post peak demand reduction of 8.230 kW. The project energy savings gross realization rate is 189%.

Project Description

The participant replaced T5 fluorescent high bay lighting with (2) LED high bay fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

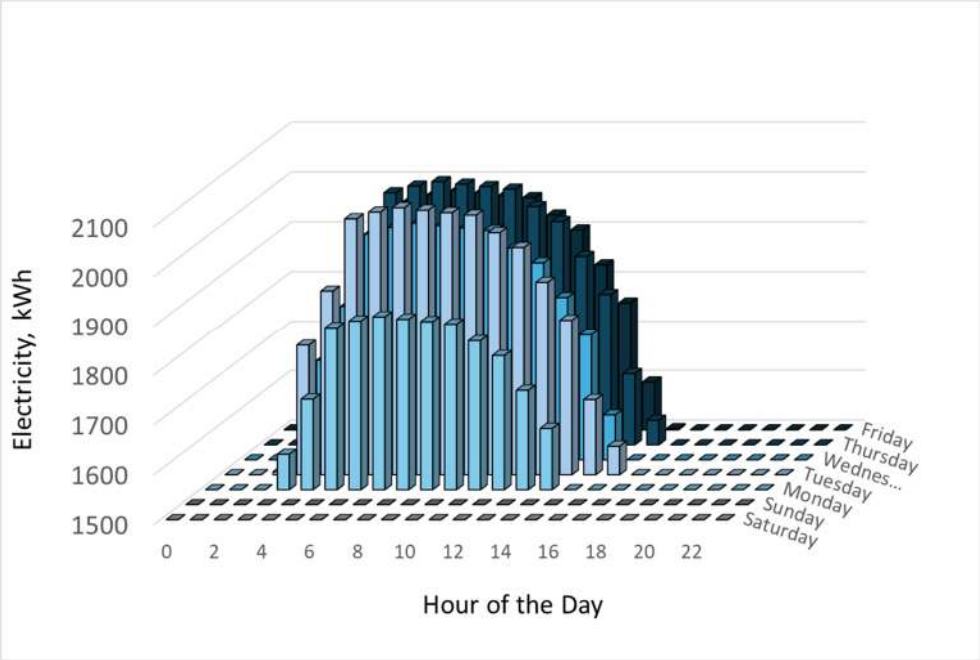
The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type



The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
T5 Flo to LED high bay	20	20	850	260	4,420	1.00	27,598	52,156	189%
Total							27,598	52,156	189%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Midstream	27,598	52,156	189%	8.230
Total	27,598	52,156	189%	8.230

The ex post annual energy savings are 52,156 kWh, with an ex post peak demand reduction of 8.230 kW. The project energy savings gross realization rate is 189%.

The ex ante savings calculation attributes are not provided for midstream measures. The ex post referenced the efficient wattage, lumen equivalence and hours of use from the participant, supported by the AMI interval data.

2.4. Sample ID 119, Sample ID 304

Executive Summary

Under a project represented by sample ID 119 and ID 304, a program participant received prescriptive and SBDI incentives from I&M for replacing linear fluorescent lighting with LED low bay fixtures and LED linear tubes in a retail store.

The ex post annual energy savings are 24,306 kWh, with an ex post peak demand reduction of 3.526kW. The project energy savings gross realization rate is 79%.

Project Description

The customer multi lamp T8 linear fluorescent fixtures with (188) LED tubes in the prescriptive program and replaced low bay fixtures with (12) LED low bay fixtures with occupancy sensors.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
T8 to LED tube	15	15	110	90	3,380	1.10	6,855	2,063	30%
6L T8HO to LED low bay	12	12	294	90	3,380	1.10	9,850	9,102	92%
4' 1L T8 to 1L T8 LED	188	188	33.8	15	3,380	1.10	14,130	13,141	93%
Total							30,835	24,306	79%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting SBDI 304	16,705	11,165	67%	1.688
Lighting Prescriptive 119	14,130	13,141	93%	1.838
Total	30,835	24,306	79%	3.526

The ex post annual energy savings are 24,306 kWh, with an ex post peak demand reduction of 3.526 kW. The project energy savings gross realization rate is 79%.

- The ex post applied a savings factor (0.37) for an occupancy sensor with high end trim to the fixture mounted low bay occupancy sensors. The source of the ex ante savings (6,855) is not clear but appears sourced from erroneous data.
- The low bay and T8 tube ex ante savings could not be replicated but appear to reference the same hours of use, base watts and installed watts.

2.5. Sample ID 120

Executive Summary

Under a project represented by sample ID 120, a program participant received prescriptive midstream incentives from I&M for replacing interior linear fluorescent lighting with LED panel fixtures and downlight in an office building.

The ex post annual energy savings are 8,782 kWh, with an ex post peak demand reduction of 0.767 kW. The project energy savings gross realization rate is 91%.

Project Description

The participant replaced 2x2 linear fluorescent fixtures with (53) LED panel fixtures and (10) downlights with LED recessed downlights.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

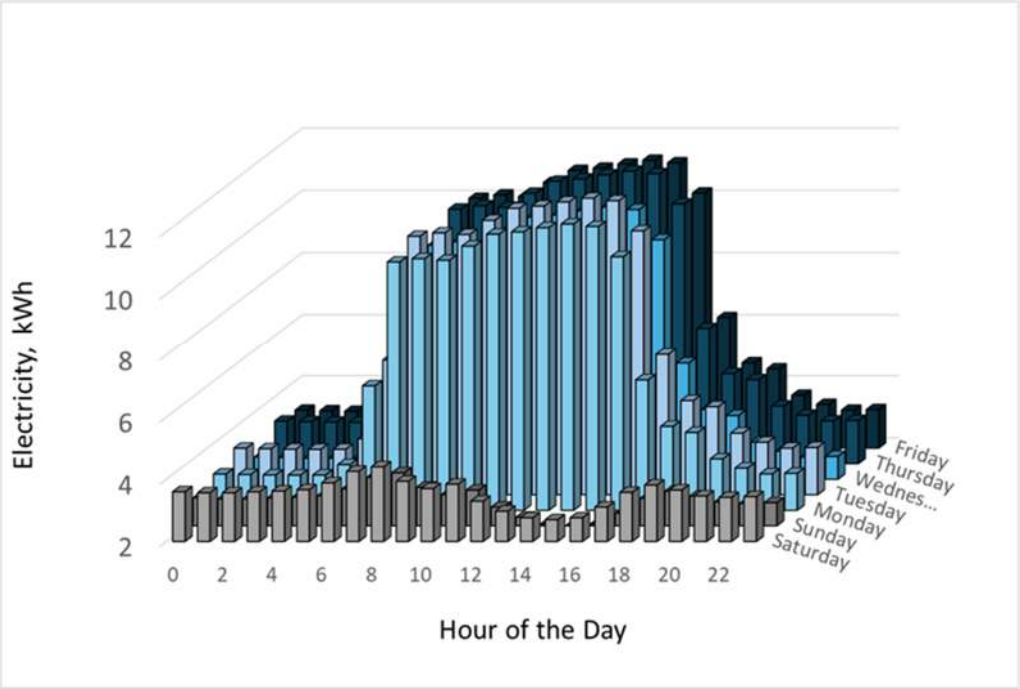
The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type



The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
2x2 Flo to LED panel	46	46	84.5	37.5	2,888	1.00	6,998	6,244	89%
2x2 Flo to LED panel	7	7	84.5	37.5	2,888	1.00	1,065	950	89%
Downlight to LED	10	10	80	25	2,888	1.00	1,603	1,588	99%
Total							9,666	8,782	91%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting	9,666	8,782	91%	0.767
Total	9,666	8,782	91%	0.767

The ex post annual energy savings are 8,782 kWh, with an ex post peak demand reduction of 0.767 kW. The project energy savings gross realization rate is 91%.

The ex ante measure attributes for existing fixtures and hours of use are not collected by the midstream prescriptive program. The ex post savings applied the lumen equivalent wattages, and verified the interval data model with the participant for the Monday to Friday schedule.

2.1. Sample ID 121, Sample ID 300

Executive Summary

Under a project represented by sample ID 121 and ID 300, a program participant received prescriptive and SBDI incentives from I&M for replacing high bay fixtures with LED high bay fixtures in a warehouse and retail building.

The ex post annual energy savings are 173,525 kWh, with an ex post peak demand reduction of kW. The project energy savings gross realization rate is 102%.

Project Description

The participant replaced (208) high bay linear fluorescent and HID fixtures with (208) LED high bay fixtures at a warehouse/retail building.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

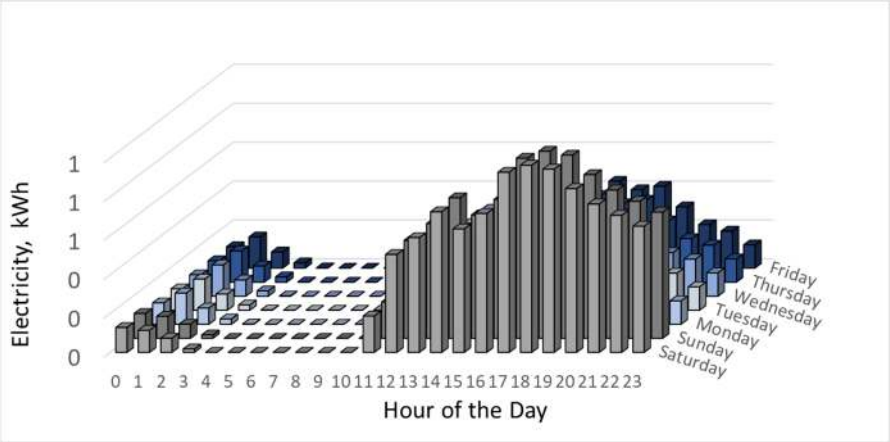
The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type



The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID to LED High Bay	8	8	392	174	3,827	1.00	6,566	6,674	102%
HID to LED High Bay	200	200	392	174	3,827	1.00	164,160	166,851	102%
Total							170,726	173,525	102%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive	6,566	6,674	102%	1.053
Lighting SBDI	164,160	166,851	102%	26.327
Total	170,726	173,525	102%	27.380

2.2. Sample ID 123

Executive Summary

Under a project represented by sample ID 123, a program participant received prescriptive incentives from I&M for replacing exterior HID parking lot fixture with LED fixtures.

The ex post annual energy savings are 4,286 kWh, with an ex post peak demand reduction of 0.991 kW. The project energy savings gross realization rate is 305%.

Project Description

The participant replaced (3) HID fixtures on a pole lamp and another (1) fixture on the building wall with LED fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID to LED pole fixture	4	4	1080	320	4,303	1.00	4,286	13,081	305%
Total							4,286	13,081	305%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting	4,286	13,081	305%	0.991
Total	4,286	13,081	305%	0.991

The ex post annual energy savings are 4,286 kWh, with an ex post peak demand reduction of 0.991 kW. The project energy savings gross realization rate is 305%. The primary difference in the saving estimate between the ex ante and ex post:

The ex post base wattage of 1080 watts is supported by the lumen equivalence (48,000 lumens) of the installed LED fixtures. The ex ante prescriptive savings per unit appears weighted towards 400 watts.

2.3. Sample ID 124

Executive Summary

Under a project represented by sample ID 124, a program participant received midstream prescriptive incentives from I&M for replacing T5 linear fluorescent lighting with LED fixtures in a manufacturing building.

The ex post annual energy savings are 4,717 kWh, with an ex post peak demand reduction of 0.744 kW. The project energy savings gross realization rate is 113%.

Project Description

The participant replaced (12) 3-lamp T5HO linear fluorescent fixtures with (12) LED vapor tight fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
3L T5HO Flo to LED	12	12	162	99	6,240	1.00	4,158	4,717	113%
Total							4,158	4,717	113%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting	4,158	4,717	113%	0.744
Total	4,158	4,717	113%	0.744

The ex post annual energy savings are 4,717 kWh, with an ex post peak demand reduction of 0.744 kW. The project energy savings gross realization rate is 113%.

The attributes of ex ante savings calculations from the midstream program are not provided, but the ex post savings is based on the installed watts, lumen equivalent base fixtures and the hours of use from the participant supported by the AMI interval data for a 5 day 24/7 working schedule.

2.1. Sample ID 125

Executive Summary

Under a project represented by sample ID 126, a program participant received prescriptive incentives from I&M for installing split air conditioning units with more efficient units that exceed the current federal efficiency standards for air cooled commercial 3-phase split air conditioning units.

The ex post annual energy savings are 8,014 kWh, with an ex post peak demand reduction of 0.607 kW. The project energy savings gross realization rate is 209%.

Project Description

The customer installed (10) split air conditioning units for a healthcare facility with SEER efficiency ranging from 13 to 20 SEER, with (9) of the units exceeding the federal energy efficiency minimum requirement.

Measurement and Verification Effort

The variables for the energy savings algorithm are summarized in the following table.

Savings Algorithm Inputs

Measure	*Qty*	*Capacity Tons*	*Efficiency Base*	*Efficiency Installed*	*Units*	*EFLH Cooling*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
2 ton AC	1	2.0	13	20	SEER	1,571	3,827	1,015	209%
2 ton AC	1	2.0	13	20	SEER	1,571		1,015	
2 ton AC	1	2.0	13	20	SEER	1,571		1,015	
1 ton AC	1	1.0	13	20	SEER	1,571		508	
1 ton AC	1	1.0	13	20	SEER	1,571		508	
3 ton AC	1	3.0	13	18.8	SEER	1,571		1,342	
3 ton AC	1	3.0	13	18.8	SEER	1,571		1,342	
1 ton AC	1	1.0	13	20	SEER	1,571		508	
2 ton AC	1	1.5	13	20	SEER	1,571		761	
4 ton AC	1	3.8	13	13	SEER	1,571		0	
Total							3,827	8,014	209%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Prescriptive HVAC	3,827	8,014	209%	0.607
Total	3,827	8,014	209%	0.607

The ex post savings are 8,014 kWh with a 209% realization rate. Ten units were verified as installed, but the application was not clear on the incentivized units. All ten were included in the evaluation as they were equivalent to the total incentive for the project.

2.2. Sample ID 126

Executive Summary

Under a project represented by sample ID 126, a program participant received midstream prescriptive incentives from I&M for replacing linear fluorescent lamps with LED tubes at a retail store building.

The ex post annual energy savings are 1,551 kWh, with an ex post peak demand reduction of 0.24 kW. The project energy savings gross realization rate is 82%.

Project Description

The participant replaced (25) T8 linear fluorescent lamps with LED tubes.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
T8 to LED tube	25	25	32	15	3,650	1.00	1,895	1,551	82%
Total							1,895	1,551	82%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive Midstream	1,895	1,551	82%	0.24
Total	1,895	1,551	82%	0.24

The ex post energy savings are 1,551 kWh with a gross energy savings realization rate of 82%. The attributes for the ex ante savings per unit are not provided, but the ex post hours (3,650) are less than the TRM prototypical retail store building hours.

2.3. Sample ID 127

Executive Summary

Under a project represented by sample ID 127, a program participant received midstream prescriptive incentives from I&M for replacing high bay fixtures with LED high bay fixtures at a manufacturing building.

The ex post annual energy savings are 187,434 kWh, with an ex post peak demand reduction of 29.575 kW. The project energy savings gross realization rate is 92%.

Project Description

The participant replaced (1) HID high bay fixture with an LED high bay and replaced (145) multi T5 linear fluorescent lamp fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

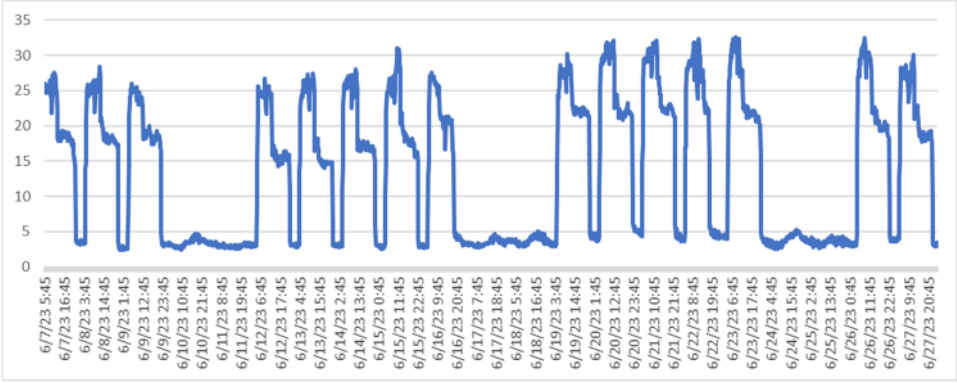
$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The AMI interval data did not exhibit a repeatable change for outdoor weather, so the simple hourly energy trend is show below. The observed usage from 5:00 Am to 11PM aligns with the site 2 shift work schedule, 5 days per week.

Two Period of Interval Metering Data



The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID to LED high bay	1	1	850	240	4,680	1.00	2,945	2,855	97%
8LT5HO Flo to LED high bay	145	145	432	160	4,680	1.00	200,083	184,579	92%
Total							203,027	187,434	92%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Prescriptive Midstream	203,027	187,434	92%	29.57
Total	203,027	187,434	92%	29.57

The ex post annual energy savings are 187,434 kWh, with an ex post peak demand reduction of 29.575 kW. The project energy savings gross realization rate is 92%.

2.4. Sample ID 200

Executive Summary

Under a project represented by sample ID 200, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 1,914,172 kWh, peak demand savings are 384.90 kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 1172 CFM of compressed air leaks. The reduced air load removed all of the load from one compressor, and reduced the load on a 2nd air compressor, in a 5 air compressor plant.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	1419	1419
Leaks repaired, CFM	1172	1172
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	Load/Unload	Load/Unload
Operating hours	8760	8760
kW/CFM, power per reduced air	0.152 to 0.2090	0.152 to 0.2090
Control factor	N/A	N/A
CF factor	0.000201053	0.000201053
kWh savings	1,914,172	1,914,172
kW savings	384.850	384.850

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	1,914,172	1,914,172	100%	384.850
Total	1,914,172	1,914,172	100%	384.850

The ex post energy savings are 1,914,172 kWh and the ex post peak demand reduction is 384.85
The energy gross realization rate is 100%

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- Both the ex ante and ex post referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor.
- For the compressor will all of the load reduced, an alternate method was used for both the ex ante and ex post methods, to consider the air compressor full load reduced, with the fraction load control factor.

2.1. Sample ID 201

Executive Summary

Under a project represented by sample ID 201, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 751,576 kWh, peak demand savings are 151.107 kW, with an energy savings realization rate of 83%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 566 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

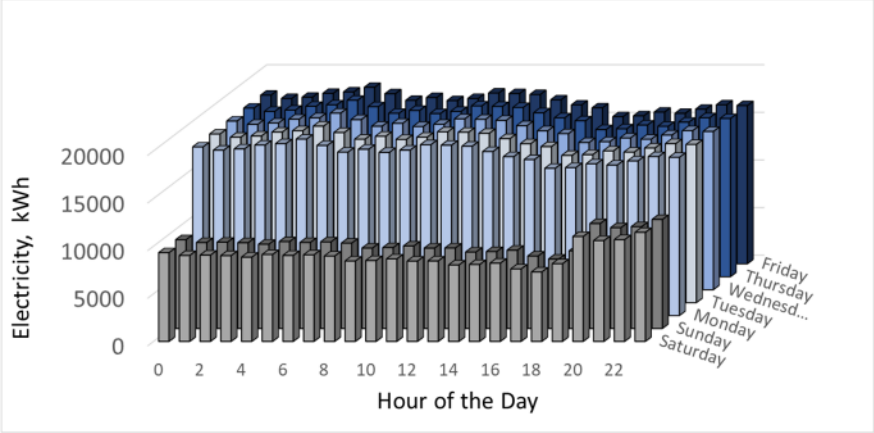
$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

Although the interval data suggests less than a 24/7 work schedule, the high weekend demand supports the air system pressurization of 24/7.

Interval Data Model



The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	623	623
Leaks repaired, CFM	566	566
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	Load/Unload	Load/Unload
Operating hours	8736	8736
kW/CFM, power per reduced air	0.1822	0.152
Control factor	1	N/A
CF factor	0.000201053	0.000201053
kWh savings	901,106	751,576
kW savings	181.170	151.107

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	901,106	751,576	83%	151.107
Total	901,106	751,576	83%	151.107

The ex post energy savings are 751,576 kWh and the ex post peak demand reduction is 313.725 The energy gross realization rate is 83%.

- The ex post savings method referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor, as tabled in the Illinois TRM version of the measure.
- The ex ante savings method utilized the full load power per CFM, without usage of a control factor. This is agreeable for multi-compressor plants when the entire load is removed. Also, for reduced air load on VFD air compressors when the CAGI sheet informs zero power at zero flow, the full load efficiency is equal to the fractional load. For other control types, a control factor value is applied, or usage of the TRM table for aggregated power and control type.

2.2. Sample ID 202

Executive Summary

Under a project represented by sample ID 202, a program participant received custom incentives from I&M for installing a glass tempering process with variable speed fans at a manufacturing building.

The ex post annual energy savings are 872,969 kWh, with an ex post peak demand reduction of 43.96kW. The project energy savings gross realization rate is 100%.

Project Description

The customer specified VSD fan control for controlling the upper and lower airflow within a new glass tempering process machine.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the rational for the baseline determination, new equipment specification data, trend motor data from the post install period.

The following algorithms for energy and coincident peak demand savings were sourced from the measure: *Illinois TRM 10 for VFD.*

$$kWh_{savings} = \sum_{Area} [Hours\ x\ (Power_{base} x\ PLR_{base} - Power_{installed} x PLR_{installed})\ x\ LF\ x\ Duty]$$

Where:

$kWh_{savings}$	*= Annual energy savings*
$kW_{savings}$	*= Annual coincident peak demand savings*
Power	*= Power of motor, kW*
PLR	*= Part load ratio, Power to Flow at 10% bins*
Hours	*=Lighting annual operating hours*
LF	*= Fan and motor load factor, 65% IL TRM 10 VFD*
Duty	*=Duty cycle of cooling fan during tempering process*

The base condition for the ex ante savings is a constant speed backward incline fan, with inlet vane dampers. The plant has another tempering oven with vane dampers. The Evaluation Team referenced *The Glass Tempering Handbook, Jonathan Barr, 2016,* which stated "fan output pressure can be controlled by either inlet vanes or by the speed of the fan wheel". The Evaluation Team also contacted the manufacturer of the installed tempering equipment who stated currently only building equipment with air flow control by VFD drives. As this new equipment is replacing

existing equipment, the evaluation approach is early replacement for the remaining useful life, with normal replacement after the baseline shift.

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Input	*Ex Ante*	*Ex Post*
Fan motor power, kW	400	400
Quantity	2	2
Load, IL TRM, %	65	65
Flow fraction, 10%, Inlet damper, BI fan	0.38	0.38
VFD control type, IL TRM	Low static pressure	Duct static control
Flow fraction,10% VSD	0.05	0.09
Duty cycle	1	0.89
Work hours	6240	6240
kWh savings	1,131,499	890,947
Program cap savings	872,969	872,969
kW savings,	-	43.96
kWh savings, normal replacement, after baseline shift	-	0.00

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
VFD fan Custom	872,969	872,969	100%	43.96
Total	872,969	872,969	100%	43.96

The ex post annual energy savings are 872,969 kWh, with an ex post peak demand reduction of 43.96kW. The project energy savings gross realization rate is 100%.

- The calculated savings without the cap for the ex post was less than the ex ante, due to the inclusion of the duty cycle, as the trended motor current data indicated non-continuous processing of the glass in the tempering process within the scheduled work hours.

- The baseline of a non-VFD motor for normal replacement may have low probability, as VFD drives have approached the material cost of simple motor starters.

2.3. Sample ID 203

Executive Summary

Under a project represented by sample ID 203, a program participant received prescriptive incentives from I&M for installing higher efficiency lighting than required by the local building code.

The ex post annual energy savings are 626,008 kWh, with an ex post peak demand reduction of 54.633 kW. The project energy savings gross realization rate is 75%.

Project Description

The participant installed (2168) LED light fixtures including troffers, recessed lights, surface panel, and suspended, along with (45) LED exterior fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

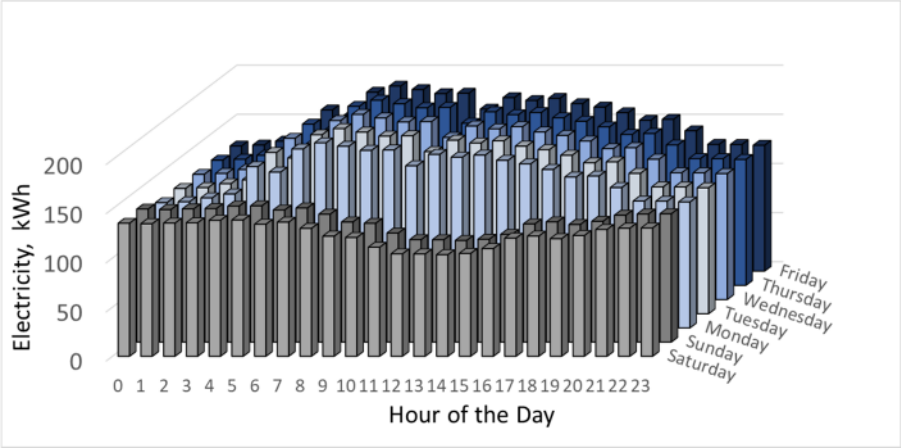
$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

AMI interval metering data, weather data, day of the week, and hour of the day data were linearly regressed to build a model that ultimately excludes the weather dependent energy usage.
Although the hospital is open 24/7, there is an urgent care section that is open 7AM-9PM.



The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*	*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
		Base	*Efficient*					
2x2 LED Troffer	112	60	24	8,760	1.15	48,745	40,395	83%
2x4 LED Troffer	132	104	42	8,760	1.15	99,880	82,771	83%
4' LED Strip	152	102	41	8,760	1.15	112,543	93,265	83%
Recessed LED Can	12	32	13	4,171	1.15	2,752	1,086	39%
Recessed LED Can	259	43	18	4,171	1.15	81,852	32,301	39%
Recessed LED Can	62	143	58	8,760	1.15	64,604	53,538	83%
Recessed LED Can	26	26	10	8,760	1.15	4,883	4,047	83%
Recessed LED Can	2	24	10	8,760	1.15	347	287	83%
Recessed LED Can	8	229	92	8,760	1.15	13,306	11,027	83%
Recessed LED Can	18	43	18	8,760	1.15	5,689	4,714	83%
2x4 LED Panel	23	98	39	8,760	1.15	16,382	13,576	83%
Surface LED Panel	83	98	39	8,760	1.15	58,891	48,804	83%
Surface LED Panel	14	108	43	8,760	1.15	10,935	9,062	83%
LED Strip	1	328	132	8,760	1.15	2,384	1,975	83%
LED Strip	8	437	176	8,760	1.15	25,427	21,071	83%
Recessed LED Can Light	14	67	27	8,760	1.15	6,826	5,657	83%
LED suspended	1197	20	8	8,760	1.15	172,932	143,310	83%
Surface LED Mount LED	19	98	40	8,760	1.15	13,553	11,232	83%
Surface LED Mount LED	26	59	24	8,760	1.15	11,175	9,261	83%

Measure	*Quantity*	*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
		Base	*Efficient*					
LED Exterior pole	2	407	111	4,318	1.00	5,611	2,558	46%
LED Exterior pole	6	260	71	4,318	1.00	10,767	4,908	46%
LED Exterior pole	8	407	111	4,318	1.00	22,445	10,231	46%
LED Exterior pole	1	407	111	4,318	1.00	2,806	1,279	46%
LED Exterior pole	4	260	71	4,318	1.00	7,178	3,272	46%
LED Exterior pole	3	260	71	4,318	1.00	5,384	2,454	46%
LED Exterior pole	1	407	111	4,318	1.00	2,806	1,279	46%
LED Exterior pole	1	260	71	4,318	1.00	1,795	818	46%
LED Exterior pole	1	407	111	4,318	1.00	2,806	1,279	46%
LED Exterior pole	14	198	54	4,318	1.00	19,108	8,710	46%
LED Exterior wall pack	4	147	40	4,318	1.00	4,044	1,843	46%
Total						837,854	626,008	75%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
NC Lighting Power Density	837,854	626,008	75%	54.633
Total	837,854	626,008	75%	54.633

The ex post energy savings are 626,008 kWh with a gross energy savings realization rate of 75%. The ADM evaluation plan for custom measures indicated that the calculation of gross savings utilizes the Indiana TRM workbook. The proposed baseline assumption for *measure 4.5.7 Lighting Power Density is IECC2018.* The ADM staff agree with the VEIC proposed assumption over the ASHRAE 90.1 2007 (IECC 2009), as lighting technology and efficacy accelerated over this period. The impact for the evaluation of this project was determining the base lighting wattage with a LDP of 1.05 compared to the ex ante value of 1.20 W/SF for the interior lighting, and 0.08 W/SF for the parking area instead of the ex ante value of 0.15 W/Sf. These LPD values have continued to reflect the migration to LED lighting with the IECC 2024 hospital LPD of 0.92 and 0.052 for parking areas (zone4).

2.4. Sample ID 204

Executive Summary

Under a project represented by sample ID 204, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 829,130 kWh, peak demand savings are 166.7 kW, with an energy savings realization rate of 101%.

Project Description

The ultrasonic leak detection audit identified 140 CFM of equipment air leaks and subsequently repaired 128 CFM. The reduced air load reduced the energy usage of one (300 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	140	140
Leaks repaired, CFM	128	128
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	VSD	VSD
Operating hours	8736	8736
kW/CFM, power per reduced air	0.1761	0.178
Control factor	1	N/A
CF factor	0.000201053	0.000201053
kWh savings	820,415	829,130
kW savings	164.90	166.70

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	820,415	829,130	101%	164.90
Total	820,415	829,130	101%	166.70

The ex post energy savings are 829,130 kWh and the ex post peak demand reduction is 166.70 The energy gross realization rate is 101%.

The compressor efficiency is similar for the ex ante and ex post resulting in nearly the same savings estimate. But, the ex ante applied the efficiency as kW/CFM x CF, with a control factor of one.

2.1. Sample ID 205

Executive Summary

Under a project represented by sample ID 205, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 586,885 kWh, peak demand savings are 118.00 kW, with an energy savings realization rate of 93%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 435 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the trim air compressor and reduced all load for a base air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired} \, x \, \frac{kW}{CFM} \, x \, Hours$$

$$kW_{save} = kWh_{save} \, x \, CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*		*Ex Post*	
Leaks found, CFM	435		435	
Leaks repaired, CFM	236	199	236	199
Compressor equipment	Rotary Screw 50 hp	Rotary Screw 50 hp	Rotary Screw 50 hp	Rotary Screw 50 hp
Compressor control	Load/Unload	Load/Unload	Load/Unload	Load/Unload
Operating hours	8064	8064	8064	8064
kW/CFM, power per reduced air	0.1801	0.1801	0.1801	0.152
Control factor	NA	1	NA	N/A
CF factor	0.000201053		0.000201053	
kWh savings	631,999		586,885	
kW savings	-		118.00	

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	631,999	586,885	93%	118.00
Total	631,999	586,885	93%	118.00

The ex post energy savings are 586,885 kWh and the ex post peak demand reduction is 118.00 The energy gross realization rate is 93%.

- The ex post savings method referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor, as tabled in the Illinois TRM version of the measure.
- The ex ante savings method utilized the full load power per CFM, without usage of a control factor. This is agreeable for multi-compressor plants when the entire load is removed. Also, for reduced air load on VFD air compressors when the CAGI sheet informs zero power at zero flow, the full load efficiency is equal to the fractional load. For other control types, a control factor value is applied, or usage of the TRM table for aggregated power and control type.

2.2. Sample ID 206

Executive Summary

Under a project represented by sample ID 206, a program participant received custom incentives from I&M for replacing two air cooled process chillers with two new air cooled chillers in a manufacturing building.

The ex post annual energy savings are 184,983 kWh, with an ex post peak demand reduction of 29.19 kW. The project energy savings gross realization rate is 31%.

Project Description

Two chillers are required year round for process cooling. The two new (90ton) air cooled chillers exceed TRM recommendations for efficiency at part load.

Measurement and Verification Effort

The evaluation team reviewed the chiller weather bin analysis utilized for the ex ante savings. The bin hours were agreeable. The ex post savings revised the chiller efficiency in the base case and efficient case. All variables should be set equal between the two cases, except for the attributes of the existing and new equipment.

The aggregation of project data with the savings results are in the following table.

Inputs to Savings Calculation

Variable	*Ex ante*		*Ex post*	*Source*
EER, IPLV, base	10.1		13.7	IECC 2018
EER, IPLV, installed	17.4		16.6	Trane brochure
kW/ton, base	1.188		0.876	12/EER
kW/ton, installed	0.688		0.722	12/EER
Capacity	90 tons x 2		90 tons x 2	Site provided
Constant chiller load	80%		80%	Site provided
Weather data	TMY		TMY	NOAA
Energy Savings, kWh	604,108		184,984	

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Custom Cooling	604,108	184,984	31%	29.19
Total	604,108	184,984	31%	29.19

The ex post annual energy savings are 184,983 kWh, with an ex post peak demand reduction of 29.19 kW. The project energy savings gross realization rate is 31%.

- The ex post savings method applied the same efficiency type ratings for the base case and installed case. The 72 ton load for a 90 ton capacity chiller indicated the part load rating over the full load rating. The ex ante savings appears to have used the full load rating for the base case and the part load rating for the efficient case when estimated the full year savings in the bin analysis. For an additional check, the evaluation team applied the TRM algorithm based on the difference in the reciprocal of the part load efficiency and the product of 8760 hours with 72 ton of load with tow chillers, resulting in a similar ex post savings of 193,000 kWh.

2.1. Sample ID 207

Executive Summary

Under a project represented by sample ID 207, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 540,177 kWh, peak demand savings are 108.604 kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified 474 CFM of air leaks and subsequently repaired 443 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	474	474
Leaks repaired, CFM	443	443
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	Load/Unload	Load/Unload
Operating hours	8760	8760
kW/CFM, power per reduced air	0.196	0.196
Control factor	1	1
CF factor	kWh/8760	0.000201053
kWh savings	540,177	540,177
kW savings	61.66	108.60

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	540,177	540,177	100%	108.60
Total	540,177	540,177	100%	108.60

The ex post energy savings are 540,177 kWh, peak demand savings are 108.604 kW, with an energy savings realization rate of 100%.

2.1. Sample ID 208

Executive Summary

Under a project represented by sample ID 208, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 505,236 kWh , peak demand savings are 101.579 kW, with an energy savings realization rate of 125%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 444 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

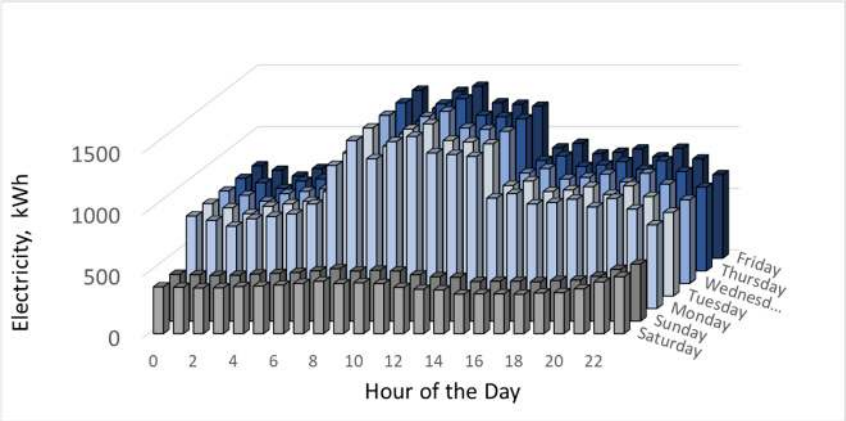
$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*=C Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

Although the interval data suggests less than a 24/5 work schedule, the site stated the air compressors operate 24/6.

Interval Data Model



The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	475	475
Leaks repaired, CFM	444	444
Compressor equipment type	Rotary screw	Rotary screw
Compressor control type	Load/Unload	Load/Unload
Operating hours	7,488	7488
kW/CFM, power per reduced air	0.1214	0.152
Control factor	0.70	N/A
CF factor	0.000201053	0.000201053
kWh savings	403,438	505,236
kW savings	53.878	101.579

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	403,438	505,236	125%	101.579
Total	403,438	505,236	125%	101.579

The ex post energy savings are 505,236 kWh and the ex post peak demand reduction is 101.579 The energy gross realization rate is 125%.

- The ex post savings method referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor, as tabled in the Illinois TRM version of the measure.
- The ex ante savings method utilized the full load power per CFM, without usage of a control factor. This is agreeable for multi-compressor plants when the entire load is removed. Also, for reduced air load on VFD air compressors when the CAGI sheet informs zero power at zero flow, the full load efficiency is equal to the fractional load. For other control types, a control factor value is applied, or usage of the TRM table for aggregated power and control type.

2.2. Sample ID 209

Executive Summary

Under a project represented by sample ID 209, a program participant received prescriptive incentives from I&M installing lighting that exceeds the baseline determined by the lighting power density allowance in a manufacturing building.

The ex post annual energy savings are 203,247 kWh, with an ex post peak demand reduction of 35.332 kW. The project energy savings gross realization rate is 57%.

Project Description

The participant identified the lighting that exceeds the state building code and specified for the new construction area, in conjunction with a lighting retrofit of the existing building. The savings are based on the area of the new building only and associated lighting.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

Baseline Wattage Comparison

Algorithm Input	*Manufacturing Building*	
	Ex Ante	*Ex Post*
Method	Whole Building	Whole Building
Building Type	Manufacturing	Manufacturing
Code Reference	ASHRAE 90.1 2007	IECC2018
Lighting Power Density	1.2 Watts per foot	0.90 Watts per foot
Allowed watts	88,908	66,681

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*	*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
		Base	*Efficient*					
High Bay	95	701	290	5,200	1.00	357,250	203,247	57%
Total						357,250	203,247	57%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Custom NC	357,250	203,247	57%	35.332
Total	357,250	203,247	57%	35.332

The ex post annual energy savings are 203,247 kWh, with an ex post peak demand reduction of 35.332 kW. The project energy savings gross realization rate is 57%.

The ex post savings method referenced the Indiana TRM 2023 which recommends the IECC2018 for the lighting power density standard. This standard represents current lighting technology better than the ASHRAE90.1 2007 version, which lists the same LPD tables as the IECCC2009, which precedes the standard referenced by nine years.

2.3. Sample ID 210

Executive Summary

Under a project represented by sample ID 210, a program participant received custom incentives from I&M for installing higher efficiency lighting than required by the local building code in a manufacturing building.

The ex post annual energy savings are 324,001 kWh, with an ex post peak demand reduction of 56.32 kW. The project energy savings gross realization rate is 126%.

Project Description

The participant installed (104) LED light panels in the office area, (284) LED high bays in the manufacturing area, (48) strip lights, and (13) exterior LED wall packs.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: 4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

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The variables for the energy savings algorithm with the realized energy savings are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*	*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
		Base	*Efficient*					
LPD to LED panel	95	49	27	6,240	1.00	24,627	13,226	
LPD to LED panel	10	33	18	6,240	1.00		928	
LPD to LED high bay	253	348	189	6,240	1.00	232,945	251,644	
LPD to LED high bay	31	263	136	6,240	1.00		24,612	
LPD to LED strip	48	149	77	6,240	1.00		21,576	
LPD to LED wall	13	365	150	4,300	1.00		12,014	
Total						257,572	324,001	126%

Results

The project expected savings and realized savings are summarized in the following table.

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting Custom NC	257,572	324,001	126%	53.324
Total	257,572	324,001	126%	53.324

The ex post annual energy savings are 324,001 kWh, with an ex post peak demand reduction of 56.32 kW. The realized savings is 126%.

Although the ex post savings is based on IECC2018 lighting power density, instead of the ex ante ASHRAE90.1 2007 standards for lighting power density, the ex post evaluation noted the high illumination levels, and determined from the site that there will be manufacturing.

2.4. Sample ID 212

Executive Summary

Under a project represented by sample ID 212, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 218,902 kWh, peak demand savings are 44.01 kW, with an energy savings realization rate of 88%.

Project Description

The ultrasonic leak detection audit identified 208 CFM of equipment air leaks and subsequently repaired 164 CFM. The reduced air load reduced the energy usage of one (125 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired} \; x \; \frac{kW}{CFM} \; x \; Hours$$

$$kW_{save} = \; kWh_{save} \; x \; CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	208	208
Leaks repaired, CFM	164	164
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	Load/Unload	Load/Unload
Operating hours	8760	8760
kW/CFM, power per reduced air	0.1735	0.152
Control factor	1	N/A
CF factor	0.000201053	0.000201053
kWh savings	249,900	218,902
kW savings	50.243	44.011

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	249,900	218,902	88%	44.011
Total	249,900	218,902	88%	44.011

The ex post energy savings are 218,902 kWh and the ex post peak demand reduction is 44.011 The energy gross realization rate is 88%.

- The ex post savings method referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor, as tabled in the Illinois TRM version of the measure.
- The ex ante savings method utilized the full load power per CFM, without usage of a control factor. This is agreeable for multi-compressor plants when the entire load is removed. Also, for reduced air load on VFD air compressors when the CAGI sheet informs zero power at zero flow, the full load efficiency is equal to the fractional load. For other control types, a control factor value is applied, or usage of the TRM table for aggregated power and control type.

2.1. Sample ID 213

Executive Summary

Under a project represented by sample ID 213, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 246,054 kWh, peak demand savings are 49.5kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified 54 CFM from equipment air leaks and subsequently repaired 43 CFM of compressed air leaks. Repaired leaks include air hoses, quick connect fittings, couplings and hose bibs.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the pre and post period air compressor power metering completed by the trade ally. Interval electric billing data for one year was aggregated in one hour periods, binned to the day of the week, to estimate the working schedule. As there was metered pre and post data, the following algorithm, also used for the ex ante savings analysis was applied to the other input variables.

$$kWh_{savings} = \sum(kW_{comp1}+kW_{comp2})-(kW_{comp1}+kW_{comp3}+kW_{comp4})_{week} x 52 weeks$$

$$kW_{savings} = kWh_{savings}\ x\ CF/\ Hours$$

Where:

kWh_{leaks}	*= Energy savings, kWh*
kW_1	*= Power at flow for450hp, modulating air compressor*
kW_2	*= Power at flow assumed load/no load air compressor*
kW_3	*= Power at flow for new 100hp, modulating air compressor*
kW_4	*= Power at flow new VSD 268 hp air compressor*
$\sum$	*=10 second interval, pre air flow equals post air flow*
$kW_{savings}$	*= Annual energy savings/8760*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and the compressor efficiency.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks Found; CFM	194	168.9
Leaks Repaired; CFM	157	145.4
kW/CFM	0.178	0.178
Hours at rated capacity	8,760	8,760
kWh savings	246,054	246,054
CF	N/A	N/A
kW reduced	49.50	49.50

Results

Realized Gross Savings

Measure Category	*kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed Air	246,054	246,054	100%	49.50
Total	246,054	246,054	100%	49.50

The ex post energy savings are 246,054 kWh, peak demand savings are 49.5kW, with an energy savings realization rate of 100%.

2.1. Sample ID 214

Executive Summary

Under a project represented by sample ID 214, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 154,479 kWh, peak demand savings are 31.058 kW, with an energy savings realization rate of 70%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 116 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

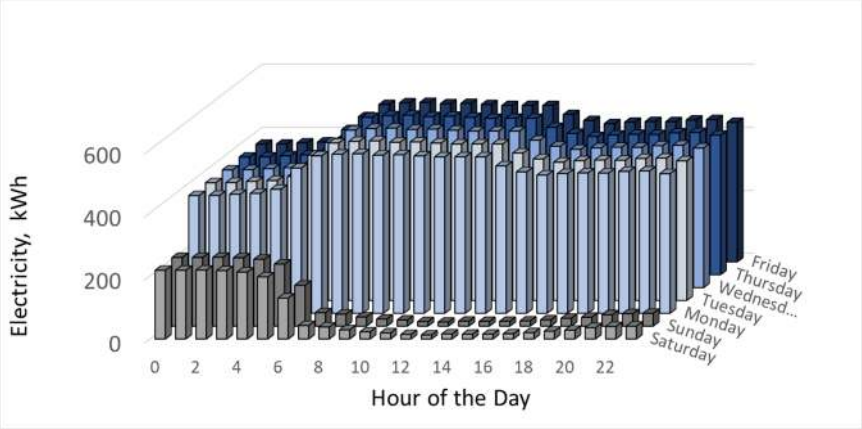
$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The interval billing data model indicates less than 24/7 operation for the compressed air.

Interval Data Model



The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	140	140
Leaks repaired, CFM	116	116
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	VSD	VSD
Operating hours	7488	7488
kW/CFM, power per reduced air	0.2525	0.178
Control factor	1	N/A
CF factor	0.000201053	0.000201053
kWh savings	219,147	154,479
kW savings	44.060	31.058

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	219,147	154,479	70%	31.058
Total	219,147	154,479	70%	31.058

The ex post energy savings are 154,479 kWh and the ex post peak demand reduction is 31.058 The energy gross realization rate is 70%.

- The ex post savings method referenced the *Indiana TRM measure 4.7.13 Compressed Air Leak Repair* which provides a table for the variable "system power reduction per reduced air demand", (kW/CFM). The table values are assumed to be the product of typical air compressor efficiency at full load and a control type factor, as tabled in the Illinois TRM version of the measure.
- The ex ante savings method utilized the full load power per CFM, without usage of a control factor. This is agreeable for multi-compressor plants when the entire load is removed. Also, for reduced air load on VFD air compressors when the CAGI sheet informs zero power at zero flow, the full load efficiency is equal to the fractional load. For other control types, a control factor value is applied, or usage of the TRM table for aggregated power and control type.

2.2. Sample ID 215

Executive Summary

Under a project represented by sample ID 215, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 194,914 kWh, peak demand savings are 39.2 kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified 41 CFM of equipment air leaks and subsequently repaired 39 CFM. The reduced air load reduced the energy usage of one (100 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	41	41
Leaks repaired, CFM	39	39
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	VSD	VSD
Operating hours	6240	6240
kW/CFM, power per reduced air	0.211	0.211
Control factor	N/A	N/A
CF factor	0.000201053	0.000201053
kWh savings	194,914	194,914
kW savings	39.2	39.2

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	194,914	194,914	100%	39.188
Total	194,914	194,914	100%	39.188

The ex post energy savings are 194,914 kWh, peak demand savings are 39.2 kW, with an energy savings realization rate of 100%.

The ex ante and ex post saving method both referenced the actual efficiency of the VSD air compressor instead of the TRM, as the fractional flow is not significant, with the compressor CAGI sheet indicated zero power at zero flow.

2.3. Sample ID 218

Executive Summary

Under a project represented by sample ID 218, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 85,360 kWh, peak demand savings are 16.58 kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified 103 CFM of equipment air leaks and subsequently repaired 90 CFM. The reduced air load reduced the energy usage of one (40 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	= *Energy savings, kWh*
$CFM_{repaired}$	= *Sum of CFM of repaired air leaks*
kW/CFM	= *Indiana TRM air generation efficiency by control type & compressor type*
Hours	= *Annual hours air system is pressurized*
$kW_{savings}$	= *Annual coincident peak demand savings*
CDF	= *Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	103	103
Leaks repaired, CFM	90.3	90.3
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	VSD	VSD
Operating hours	5,148	5,148
Power, kW/CFM,	0.183	0.183
Control factor	1	1
CF factor	0.000201053	0.000201053
kWh savings	85,360	85,360
kW savings	16.58	16.58

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	85,360	85,360	100%	16.58
Total	85,360	85,360	100%	16.58

The ex post energy savings are 85,360 kWh and the ex post peak demand reduction is 16.58 The energy gross realization rate is 100%.

The compressor efficiency is equal for the ex ante and ex post savings. As the ex ante utilized the actual efficiency (0.183) instead of the TRM prototypical (0.178). The control factor for the VSD air compressor is effectively a value of 1, as the compressor power at zero flow is zero kW.

2.1. Sample ID 219

Executive Summary

Under a project represented by sample ID 219, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 22,125 kWh, peak demand savings are 4.448 kW, with an energy savings realization rate of 102%.

Project Description

The ultrasonic leak detection audit identified and subsequently repaired 17 CFM of compressed air leaks. The reduced air load resulted in a reduced air demand for the air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired} \; x \; \frac{kW}{CFM} \; x \; Hours$$

$$kW_{save} = \; kWh_{save} \; x \; CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	19.1	19.1
Leaks repaired, CFM	16.7	16.7
Compressor equipment type	VSD	VSD
Operating hours	7488	7488
Power, kW/CFM	Not listed	0.152
CF factor	0.000201053	0.000201053
kWh savings	21,756	22,125
kW savings	-	4.448

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	21,576	22.124	102%	4.488
Total	21,576	22.124	102%	4.488

The ex post energy savings are 22,125 kWh and the ex post peak demand reduction is 4.488 The energy gross realization rate is 102%.

2.2. Sample ID 221

Executive Summary

Under a project represented by sample ID 221, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 7,473 kWh, peak demand savings are 1.500 kW, with an energy savings realization rate of 100%.

Project Description

The ultrasonic leak detection audit identified 5 CFM of equipment air leaks and subsequently repaired 5 CFM. The reduced air load reduced the energy usage of one (150 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	5	5
Leaks repaired, CFM	5	5
Compressor equipment type	Rotary Screw, 50hp	Rotary Screw, 50hp
Compressor control type	VSD	VSD
Operating hours	1,976	1,976
Comp power, kW/CFM,	0.2067	0.2067
Control factor	1	1
CF factor	0.000201053	0.000201053
kWh savings	7,473	7,473
kW savings	-	1.500

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	7,473	7,473	100%	1.50
Total	7,473	7,473	100%	1.50

The ex post energy savings are 7,473 kWh and the ex post peak demand reduction is 1.50 kW. The energy gross realization rate is 100%.

The site address listed in the tracking data does not appear to be associated with this air leak project for a 50 hp VSD air compressor identified in the air leak study as operating two days per week, at 19 hours.

2.3. Sample ID 222

Executive Summary

Under a project represented by sample ID 222, a program participant received custom incentives from I&M for the detection and repair of compressed air leaks in their industrial facility.

The ex post energy savings are 30,331 kWh, peak demand savings are 166.7 kW, with an energy savings realization rate of 101%.

Project Description

The ultrasonic leak detection audit identified 38 CFM of equipment air leaks and subsequently repaired 38 CFM. The reduced air load reduced the energy usage of one (50 hp) air compressor.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, collected the air leak log, repaired air leak log, and air compressor equipment data. Operating hours were verified with a review of the interval electric billing data. The following algorithm from the Indiana TRM workbook was referenced for the savings method below:

$$kWh_{save} = CFM_{repaired}\ x\ \frac{kW}{CFM}\ x\ Hours$$

$$kW_{save} = kWh_{save}\ x\ CDF$$

Where:

kWh_{save}	*= Energy savings, kWh*
$CFM_{repaired}$	*= Sum of CFM of repaired air leaks*
kW/CFM	*= Indiana TRM air generation efficiency by control type & compressor type*
Hours	*= Annual hours air system is pressurized*
$kW_{savings}$	*= Annual coincident peak demand savings*
CDF	*= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type*

The table below presents ex ante and ex post energy savings, verified hours of operation, CFM of the repaired leak, and air compressor data, along with the energy and peak demand savings.

Air Leak Savings Algorithm Inputs

Variable	*Ex Ante*	*Ex Post*
Leaks found, CFM	38.4	38.4
Leaks repaired, CFM	38.4	38.4
Compressor equipment type	Rotary Screw	Rotary Screw
Compressor control type	VSD	VSD
Operating hours	3822	3822
kW/CFM, power per reduced air	0.2067	0.2067
Control factor	1	1
CF factor	0.000201053	0.000201053
kWh savings	30,331	30,331
kW savings	6.098	6.098

Results

Realized Gross Savings

Measure Category	*Gross kWh Savings*			*Realized Peak kW Reduction*
	Ex Ante	*Ex Post*	*Realization Rate*	
Compressed air leak repair	30,331	30,331	100%	6.098
Total	30,331	30,331	100%	6.098

The ex post energy savings are 30,331 kWh and the ex post peak demand reduction is 6.098 The energy gross realization rate is 100%.

The ex post also referenced the actual VFD compressor efficiency, as the power at zero flow is zero indicated by the CAGI sheet.

2.4. Sample ID 302

Executive Summary

Under a project represented by sample ID 302, a program participant received SBDI incentives from I&M for replacing linear fluorescent lighting in the office area and industrial areas of the building.

The ex post annual energy savings are 33,048 kWh, with an ex post peak demand reduction of 4.865 kW. The project energy savings gross realization rate is 43%.

Project Description

The participant replaced (78) T8 linear fluorescent fixtures with LED panel fixtures in the office area, replaced (14) T12 fixtures with LED wraparound fixtures in the stairwells, and (40) T8 linear fluorescent fixtures with LED high bay fixtures in the industrial area.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
4' 4L T8 to LED panel	78	78	128	48.53	2,349	1.00	37,487	14,561	39%
4' 4L T12 to LED wrap	14	14	136	32	8,760	1.14	6,728	14,541	216%
4' 6L T8 to LED high bay	40	40	192	150	2,349	1.00	32,832	3,946	12%
Total							77,047	33,048	43%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting SBDI	77,047	33,048	43%	4.865
Total	77,047	33,048	43%	4.865

The ex post annual energy savings are 33,048 kWh, with an ex post peak demand reduction of 4.87 kW. The project energy savings gross realization rate is 43%.

The primary difference in the saving estimate between the ex ante and ex post:

- The applicant provided the fixture type and wattages of the existing fixtures, which may be less than the values used to develop the prescriptive savings per unit.
- The hours of use for the industrial area (2,349) may be less than the hours used to develop the prescriptive savings per unit.

2.5. Sample ID 303

Executive Summary

Under a project represented by sample ID 303, a program participant received SBDI incentives from I&M for replacing exterior HID area lighting and canopy lighting, along with interior linear fluorescent lighting, with LED lamps and fixtures at a convenience store building.

The ex post annual energy savings are 19,192 kWh, with an ex post peak demand reduction of 1.866 kW. The project energy savings gross realization rate is 77%.

Project Description

The participant replaced (16) HID canopy fixtures with LED fixtures, (3) area exterior fixtures with LED fixtures and (50) interior linear fluorescent lamps with LED tubes.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID canopy to LED	16	16	454	151	1,800	1.00	20,894	12,756	61%
HID area fixture to LED	3	3	454	151	4,300	1.00			
T8 Flo to LED tube	50	50	34	18	6,935	1.16	4,100	6,436	157%
Total							24,994	19,192	77%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting SBDI	24,994	19,192	77%	1.866
Total	24,994	19,192	77%	1.866

The ex post annual energy savings are 19,192 kWh, with an ex post peak demand reduction of 1.866 kW. The project energy savings gross realization rate is 77%.

The primary difference in the saving estimate between the ex ante and ex post:

- The canopy light fixtures are illuminated from dusk to close. The ex post hours (1,800) are less than the hours in the prescribed exterior measure.
- The hours for the interior LED tube replacements are based on the store open hours (6,935) which may be greater than the hours for the prescribed measure.

2.6. Sample ID 305

Executive Summary

Under a project represented by sample ID 305, a program participant received SBDI incentives from I&M for replacing exterior HID area lighting and exterior canopy lighting at a convenience store building.

The ex post annual energy savings are 3,962 kWh, with an ex post peak demand reduction of 0.300 kW. The project energy savings gross realization rate is 95%.

Project Description

The participant replaced (5) HID wall pack lighting fixtures, (2) HID canopy fixtures with LED lighting fixtures.

Measurement and Verification Effort

To verify the project savings, ADM staff reviewed available project documentation, contacted the participant, collected the existing lighting type, new lighting manufacturer model and specification data, the lighting control methods and the type of HVAC for each area. Interval electric billing data for one year was aggregated with weather data, to build an energy usage model by hour and day of the week, then reduced the weather sensitive contribution, to estimate the building load schedules.

The following algorithms for energy and coincident peak demand savings were sourced from the TRM measure: *4.5.4 LED Bulbs and Fixtures, Indiana TRM 2023.*

$$kWh_{savings} = \sum_{Area} \left[Hours\ x\ (Qty_{base} x\ W_{base} - Qty_{installed} x W_{installed}) x\ Whf_{kWh} / 1000 \frac{W}{kW} \right]$$

$$kW_{savings} = kWh_{savings}\ x\ CDF_{measure\ type}$$

Where:

$kWh_{savings}$	= Annual energy savings
$kW_{savings}$	= Annual coincident peak demand savings
Qty	= Quantity of fixtures or lamps
W	= Wattage of each fixture or lamp
Hours	= Lighting annual operating hours
Whf	= Waste heat factor, Indiana TRM 2023 by building &HVAC type
CDF	= Demand factor, Indiana 2024-2025 CDF for EM&V by measure type

The variables for the energy savings algorithm are summarized in the following table.

Lighting Algorithm Inputs & Energy Savings

Measure	*Quantity*		*Wattage*		*Annual Hours*	*Waste Heat Factor*	*Ex Ante Annual kWh Savings*	*Ex Post Gross kWh Savings*	*Gross Realization Rate*
	Base	*Efficient*	*Base*	*Efficient*					
HID wallpack to LED	5	5	284	123	4,303	1.00	3,440	3,455	100%
HID canopy to LED	2	2	198	60	1,825	1.00	752	507	67%
Total							4,192	3,962	95%

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Lighting	4,192	3,962	95%	0.300
Total	4,192	3,962	95%	0.300

The ex post annual energy savings are 3,962 kWh, with an ex post peak demand reduction of 0.300 kW. The project energy savings gross realization rate is 95%. The primary difference in the saving estimate between the ex ante and ex post:

The canopy light fixtures are illuminated from dusk to close. The ex post hours (1,825), from dusk to closing, are less than the hours in the prescribed exterior measure.

2.7. Sample ID 400

Executive Summary

Under a project represented by sample ID 400, a program participant received SEM incentives from I&M for installing a glass tempering process with a throughput per energy input exceeding the existing equipment in a manufacturing building.

The ex post annual energy savings are 872,969 kWh, with an ex post peak demand reduction of 43.96 kW. The project energy savings gross realization rate is 43%.

Project Description

The customer specified VSD fan control for controlling the upper and lower airflow within a glass tempering process machine.

Measurement and Verification Effort

The SEM program team identified additional savings after the installation of a new glass tempering process and binned the savings to

- Reduction in surface temperature of the exterior casing of the equipment
- Increased throughput resulted in reduction of equipment runtime and idle time

For the reduction in surface temperature, the ex ante based savings temperature observations of the equipment enclosure, applied the 3EPlus software to estimate the thermal energy based on the surface area, material, heat transfer coefficient, then converted the thermal losses to electric energy. The ex ante savings estimate is 891,579 kWh. The evaluation team reviewed the manufacturer website, with the narrative: *The easiest way to save energy when laminating glass is to upgrade from a traditional infrared heater furnace to full convection technology. Energy losses are minimized, as the same air is recirculated inside the furnace. The right amount of energy stabilizes the furnace temperature. Processors often report energy savings of at least 50% after a heating technology upgrade.* The evaluation team noted that reduced equipment surface temperate would be expected with the full convection technology, but did not consider the Δwaste heat as a surrogate for Δinput energy, as the waste heat will exit the equipment by conduction, convection and radiation, and a comparison produced results with high uncertainty.

For the increased throughput, the participant metered data for a month and also provided an anecdotal estimate of the reduction in running time per day. The ex ante and ex post both used the lower value, of 1,836 hours as the reduction in operating timer per year. The reduced hours resulted in reduced idle time. The ex ante savings did not identify the existing oven input power, but reference the metered idle power for the new equipment, 363 kW.

$$kwh_{savings} = Hours_{reuced}\, x\, (P_{idle} - P_{off})$$

Where:

$kWh_{savings}$ = *Annual energy savings*

$Power_{idle}$ = Idle power of new unit, surrogate of existing unit, 363 kW

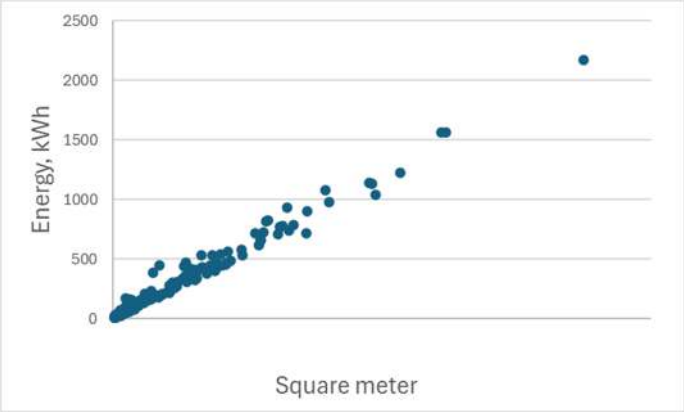
$Power_{off}$ = Off power of new unit, zero

$Hours_{reduce}$ =*Hours converted from Idle to Off, 1.5 days per week*

The ex ante and ex post savings are equal at 665,602 kWh.

There are still additional savings that could be captured by,

$[(kWh/SquareMeter_{tempered})_{existing} - (kWh/SquareMeter_{tempered})_{efficient}] \times Meter^2$ per year



Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
Waste heat	891,679	0	0	0
Weekend shutdown	665,602	665,602	100%	75.98
Total	1,557,181	665,602	43%	75.98

The ex post annual energy savings are 665,602 kWh, with an ex post peak demand reduction of 43.96kW. The project energy savings gross realization rate is 43%.

- The calculated savings without the cap for the ex post was less than the ex ante, due to the inclusion of the duty cycle, as the trended motor current data indicated non-continuous processing of the glass in the tempering process within the scheduled work hours.
- The baseline of a non-VFD motor for normal replacement may have low probability, as VFD drives have approached the material cost of simple motor starters.
- The year 2023 annual energy usage for the site associated with this project in the program tracking data is 432,0533 kWh

2.8. Sample ID 401

Executive Summary

Under a project represented by sample ID 401, a program participant received SEM incentives from I&M for identifying and continuously implementing an energy saving measures, including LED lighting, process improvements and process insulation upgrades.

The ex post annual energy savings are 271,022 kWh, with an ex post peak demand reduction of 30.94 kW. The project energy savings gross realization rate is 63%.

Project Description

Supplementing the other prescriptive and custom projects completed in 2023 to 2024, the SEM team identified additional opportunities. Measures completed include breakroom LED lighting, process improvements to production line, insulation on equipment replaced, and preventative maintenance on equipment.

Measurement and Verification Effort

The evaluation team reviewed the Strategic Energy Management Customer Report, collected AMI interval data, aggregated project data from prescriptive and custom projects completed during the baseline period 10/31/22 to 10/29/2023 and the reporting period, 10/30/2023 to 10/27/2024 . The implementation team utilized weather data, production data and AMI interval billing data to create a model in the CUSUM workbook, cumulative sum of savings.

The aggregation of project data with the savings results are in the following table.

Inputs to Savings Calculation

Variable	*Ex ante*	*Ex post*	*Source*
CUSUM model savings	869,854	869,854	CUSUM workbook
2023:Air nozzles	-4,500	-4,500	Program tracking data
2024: New chiller	-382,268	-382,268	Program tracking data
2023: Chiller Tune up	-17,312	-17,312	Program tracking data
2024: Air leak repair	-35,054	-35,054	Program tracking data
2023: Air leak repair	0	-159,698	Program tracking data
Capital projects excluded	439,134	598,832	CUSUMv1, v2
Energy Savings, year 1	430,719	271,022	CUSUMv1, v2

The projects savings in the previous table were apportioned based on the implementation date and number of days after a parameter data. The ex post savings for 2023 leak repair of 191,012 were proportioned to 159,698, but entered with a 10/30/2023 implementation date to find the constraints of the CUSUM workbook.

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
SEM	430,719	271,022	63%	30.94
Total	430,719	271,022	63%	30.94

The ex post annual energy savings are 271,022 kWh, with an ex post peak demand reduction of 30.94 kW. The project energy savings gross realization rate is 63%. The primary difference in the savings estimates area:

The ex post excluded the proportioned savings for the 2023 compressed air leak project.

2.9. Sample ID 402

Executive Summary

Under a project represented by sample ID 402, a program participant received SEM incentives from I&M for identifying and implementing an energy saving measure for replacing compressed air with blower air for a process at a manufacturing building.

The ex post annual energy savings are 293,951 kWh, with an ex post peak demand reduction of 34.0 kW. The project energy savings gross realization rate is 93%.

Project Description

The SEM team identified a savings opportunity for replacing the pressurized air flowing through nozzles, with a low pressure air blower along with air knives installed over the process equipment.

Measurement and Verification Effort

The evaluation team reviewed the Strategic Energy Management Customer Report, December 2024, collected AMI interval data, and the trending data performed by the program implementer.

The expected savings was less than 1% of the annual usage, so the IPMVP Option A methodology used by the ex ante savings estimate is agreeable. The inputs for the retrofit isolation are in the following table:

Inputs to Savings Calculation

Variable	*Ex ante*	*Ex post*	*Source*
Base: Air flow at 3mm nozzle	22.52	21	IL TRM10 Air nozzles, 0.125” dia
Nozzle count	19	19	participant
Compressed air, kW/cfm	0.18	0.18	Indiana TRM2023 Air leak repair
Hours per year, low flow, post	4500-	4500-	participant
Installed blower power, kW	6.5	6.5	specifications
Base case energy, kWh	346,585	323,190	
Efficient case energy, kWh	29,239	29,239	
Energy savings, kWh	317,346	293,951	93% RR

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
SEM	317,346	293,951	93%	33.56
Total	317,346	293,951	93%	33.56

The ex post annual energy savings are 293,951kWh, with an ex post peak demand reduction of 33.56 kW. The project energy savings gross realization rate is 93%.

With many parameters of the savings calculations not measurable, the ex post savings referred to the TRM for air flow of a typical nozzle.

2.10. Sample ID 403

Executive Summary

Under a project represented by sample ID 403, a program participant received SEM incentives from I&M for identifying and implementing measures throughout the year.

The ex post annual energy savings are 181,714 kWh, with an ex post peak demand reduction of 20.74 kW. The project energy savings gross realization rate is 110%.

Project Description

Continuous process improvements by the participant in their manufacturing building are tracked and added to the Cumulative Sum model (CUSUM), along with interval billing data, weather data and production data. Savings in addition to other capital projects were achieve for additional air leak repairs, production schedule adjustments and AC setpoints.

Measurement and Verification Effort

The evaluation team reviewed the Strategic Energy Management Customer Report, December 2024, aggregated 2022, 2023 and 2024 programing tracking data. The team also leveraged the realized savings from the report for Sample ID 214, associated with air leak savings.

Variable	*Ex ante*	*Ex post*
CUSUM model savings, kWh	277,504	260,435
Reporting period days	308	301
Capital project adjustments	Prorated ex ante	Prorated ex post
Air leak project 2023	Flag for both pre/post	Flag for both pre/post
Air leak project 2024 70% realized savings	111,675	78,721
Energy savings, kWh	165,829	181,714

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
SEM	165,1829	181,714	110%	20.74
Total	165,1829	181,714	110%	20.74

The ex post annual energy savings are 181,714 kWh, with an ex post peak demand reduction of 20.74 kW. The project energy savings gross realization rate is 110%.

The ex ante and ex post both utilize the project CUSUM workbook. Although the changepoint indicator in month 4 was early to fully represent capital projects in months 7 and 10, the visual review of the predicted and actual trends indicated a good fit. The month 7 holiday week in the reporting period was excluded as an anomaly with a predicted energy use at 250% of the actual usage. The CUSUM savings was 148,760, but the evaluated results of sample 214 with 70% realized savings resulted in less removed savings for capital projects, resulting in 181,714 kWh savings for the SEM project.

2.11. Sample ID 404

Executive Summary

Under a project represented by sample ID 404, a program participant received SEM incentives from I&M for identifying and implementing an energy saving measure for scheduling an air handling unit in a warehouse at a manufacturing facility.

The ex post annual energy savings are 9,979 kWh, with an ex post peak demand reduction of 0.0 kW. The project energy savings gross realization rate is 100%.

Project Description

The SEM team identified a savings opportunity for reducing the runtime of an air handling unit (AHU). The motor on the AHU was cycling on/off during unoccupied evening periods, with the schedule revised to run a constant low speed.

Measurement and Verification Effort

The evaluation team reviewed the Strategic Energy Management Customer Report, December 2024, collected AMI interval data, and the trending data performed by the program implementer.

The expected savings was less than 1% of the annual usage, so the IPMVP Option A methodology used by the ex ante savings estimate is agreeable. The inputs for the retrofit isolation are in the following table:

Inputs to Savings Calculation

Variable	*Ex ante*	*Ex post*
High flow, motor kW, metered	13	13
Low flow, motor kW, metered	1.45	1.45
Hours per year, high flow, pre	864	864
Hours per year, low flow, post	-	-
Energy savings, kWh	9,979	9,979

Results

Gross Energy Impacts Summary

Measure Category	*kWh Savings*			*Ex Post Gross kW Savings*
	Ex Ante	*Ex Post*	*Realization Rate*	
SEM	9,979	9,979	100%	0.00
Total	9,979	9,979	100%	0.00

The ex post annual energy savings are 9,979 kWh, with an ex post peak demand reduction of 0.0 kW. The project energy savings gross realization rate is 100%.

3. C&I Participant Survey Instrument

Screening / background

1. Our records indicate that you are the main contact for the [FR_MEAS1] project completed at [LOCATION].
2. Were you involved in the decision to complete this project?

   1. Yes
   2. No

3. Could you provide the name and contact information of the person most knowledgeable about the decision to complete this project?

[Terminate if Q2 = 2]

4. Does your company have any of the following policies or procedures in place at [LOCATION]?

[FOR EACH, 1 = Yes, 2 = No, 98 = Don't know]

a) A person or persons responsible for monitoring or managing energy usage
b) Defined energy savings goals
c) A specific policy requiring that energy efficiency be considered when purchasing equipment
d) Carbon reduction goals

Program Awareness

5. How did you FIRST learn about Indiana Michigan Power's incentives for efficient equipment upgrades?

[RANDOMIZE 1 – 10, FIX 11 and 98]

1. From a Trade Ally/contractor/equipment vendor/ energy consultant
2. From an Indiana Michigan Power Account Representative
3. From a program representative / CLEAResult
4. From an internet search
5. At an event/trade show
6. Received an email blast or electronic newsletter
7. Received an informational brochure
8. From a program sponsored webinar
9. From *Indiana Michigan*'s website
10. Friends or colleagues
11. Some other way (please explain) [OPEN]
98. Don't know

Program Delivery Efficiency

Onsite Energy Assessment

6. Did [PROGRAM TA/REPRESENTATIVE] complete an onsite energy evaluation or survey of your facility?

1. Yes
2. No

[Display IF Q6= 1]

7. Upon completion of your initial assessment, were there any energy efficiency measures recommended that you did not implement?

1. No, we implemented all of the recommended measures
2. Yes, there were some recommended measures that we did not install
98. Don't recall

[Display if Q7=2]

8. Which recommended measures did you **not** install? **[Multiple response]**

1. Lighting replacements
2. Lighting controls
3. HVAC measures
4. Refrigeration measures
5. Food service measures
6. Compressed air measures
7. Other measures not listed above (Please describe)
98. Don't recall

[Display if Q7=2]

9. Why did you not install those recommended measures? **[Multiple response]**

1. High initial cost
2. Identifying potential areas for improvement/lack of technical knowledge
3. Other investments/improvements have higher funding priority
4. Long payback period/return on investment
5. Unaware of available incentives for energy efficient equipment
6. Lack of corporate support for energy efficiency investments
7. Lack of staff time to pursue energy efficiency upgrades
8. Finding a contractor/vendor with which to work
9. Confusion about who to contact for information or navigating the energy efficiency program offerings
10. Completing the required paperwork to receive the incentive
11. Don't own building
12. Other, please specify [Anchor]

SBDI Trade Ally Experience

[Display Q10 IF SBDI = 1]

10. Using the scale below, please indicate how much you agree or disagree with the following statements regarding your experience with your SBDI Trade Ally:

[SCALE: 1 = 1 (Completely disagree), 2 = 2, 3 =3, 4 = 4, 5 = 5 (Completely agree), 98 = Not applicable]

[RANDOMIZE A – D]

a) My SBDI Trade Ally's recommendations made sense for my business.
b) My SBDI Trade Ally could answer my questions about the program.
c) My SBDI Trade Ally could answer my questions about my project.
d) I would recommend my SBDI Trade Ally as a contractor to consider.

[Display Q11 IF Q10a, Q10b, Q10c, or Q10d < 3]

11. What could your SBDI Trade Ally have done differently that would have improved your opinion of the service they provided?

Application Process and Project Completion

[Display Q12 IF SBDI = 0]

12. Which of the following people worked on completing your application for program incentives (including gathering required documentation)?

[MULTI SELECT]

1. Yourself
2. Another member of your company
3. A contractor
4. An equipment vendor
5. A designer or architect

[Display Q13 IF Q12 = 1]

13. Using a 5-point scale, where 1 means "completely unacceptable" and 5 means "completely acceptable," how would you rate . . .

[SCALE: 1 = 1 (Completely unacceptable), 2 = 2, 3 =3, 4 = 4, 5 = 5 (Completely acceptable agree), 99 = Not applicable]

a) the ease of finding the application on Indiana Michigan Power's website
b) the ease of completing the application
c) the time it took to approve the application
d) the clarity of information on how to complete the application
e) the effort required to provide required invoices or other supporting documentation
f) the overall application process

[Display Q14 IF Q13a)-f) < 3]

14. How could the application process be improved?

[Display Q15 IF Q12 = 1]

15. Did you have a clear sense of whom you could go to for assistance with the application process?

1. Yes
2. No
98. Don't know

[Display Q16 IF SBDI = 1]

16. How long did you have to wait for the equipment to be installed after the onsite assessment was performed? Would you say…

1. Less than 1 week
2. 1-2 weeks
3. 3-4 weeks
4. 5-6 weeks
5. More than 6 weeks
6. All equipment was installed the same day
98. Don't know

[Display Q17 IF SBDI = 0]

17. Who installed your program-qualified equipment or efficiency upgrades? Was it…

1. Your own staff
2. A contractor you've worked with before
3. A contractor recommended by the Indiana Michigan program (registered trade ally)
4. A new contractor that someone else recommended
5. Someone else (Please specify)
98. Don't know

Energy Efficiency as a Service – Non-Participants

[Display section if EEaaS = 0 and STATE = IN]

18. I&M now offers a new program called Energy Efficiency-as-a-Service that provides efficiency improvements to commercial and industrial customers with zero upfront costs and immediate savings. I&M's partner, Allumia funds, installs, and maintains a complete upgrade and meters the actual savings achieved on a monthly basis. During the fixed contract term, the customer shares a percentage of the metered savings achieved to cover the cost of the program.

Before taking this survey, did you know that I&M offers this program?

1. Yes
2. No
98. Not sure

[Display if Q18 = 1]

19. Did you consider this service when you were planning your project?

1. Yes
2. No

98. Not sure

[Display if Q19 = 1 or 2]

20. Why did you choose not to participate in Energy Efficiency-as-a-Service?

[Multiselect]

1. Concerns about sharing a percentage of savings with the program provider.
2. I prefer to handle energy efficiency improvements in-house.
3. Skepticism about the program's promised immediate savings.
4. Lack of trust in the program provider (Allumia funds).
5. Not interested in committing to a fixed-term contract.
6. I have financial constraints that prevent me from participating.
7. I find the zero upfront cost aspect too good to be true.
8. I had another financing option available
9. Other (please specify)

Energy Efficiency as a Service - Participants

[Display section if EEaaS = 1]

21. Our records say that you worked with I&M's Energy Efficiency as a Service Program. Through this program, Allumia provides design, financing, and implementation assistance.

Did your organization work with the Energy Efficiency as a Service Program?

1. Yes
2. No
98. Not sure

[Display if Q21 = 1]

22. Which aspect of the Energy Efficiency as a Service were the most important benefits to you when you were considering the service? Please select up to two options.

[Multiselect]

1. Project financing
2. Project management
3. The system maintenance provided
4. System design services
5. Installation services
6. Something else

[Display if Q23 = 6]

23. What was other benefit of the service that was important to you?

[Display if Q21 = 1]

24. How satisfied are you with the following aspects of the Energy Efficiency as a Service Program?

[SCALE: 1 = 1 (Very dissatisfied), 2 = 2, 3 =3, 4 = 4, 5 = 5 (Very satisfied), 99 = Not applicable]

a) The information you received on how the service works.
b) The financing provided through the program.
c) The process of installing the energy-saving equipment.
d) The process of installing the metering system.
e) The information you receive about the performance of the project.
f) The impact on your electricity bill.

[Display if any in Q24 < 3]

25. What would have made you more satisfied with the Energy Efficiency as a Service Program?

Decision Making and Equipment Selection

26. Has your organization purchased any significant energy efficient equipment in the last three years without applying for a financial incentive through an energy efficiency program at the [LOCATION] location?

1. Yes. Our organization purchased energy efficient equipment but did not apply for incentive.
2. No. Our organization purchased significant energy efficient equipment and applied for an incentive.
3. No significant energy efficient equipment was purchased by our organization.
98. Don't know

[Display Q27 IF Q26 = 1 or 2]

27. Which of the following financial methods, if any, does your organization typically use to evaluate energy efficiency improvements?

[Multiselect]

1. Initial Cost
2. Simple payback
3. Internal rate of return
4. Life cycle cost
5. We don't use any of these
98. Don't know

[Display Q28 IF Q27= 2]

28. What payback period do you typically require to approve an efficiency project?

[Display Q29 IF Q27= 3]

29. What internal rate of return do you typically use to approve an efficiency project?

30. Before participating in the I&M program had you implemented any equipment or measure similar to the [FR_MEAS1] [INSTALLED_FR1] at the [LOCATION] location?

1. Yes
2. No
98. Don't know

31. When did you first learn about I&M's energy efficiency program? Was it BEFORE or AFTER you finalized the specifications of your [FR_MEAS1] project, including the efficiency level and the scope of the project?

1. Before
2. After
98. Don't know

32. Did you have plans to [INSTALL_FR1] the [FR_MEAS1] at the [LOCATION] location before participating in the program?

1. Yes
2. No
98. Don't know

[Display Q33 IF Q32 = 1]

33. Prior to hearing about the program [FINANCING_INCENTIVE], was the purchase of the [FR_MEAS1] included in your organization's capital budget?

1. Yes
2. No
98. Don't know / Not applicable

[Display Q34 IF Q32 = 1]

34. Had your organization ALREADY ordered or purchased the [FR_MEAS1] BEFORE you heard about the program?

1. Yes
2. No
98. Don't know

35. Did the program [FINANCING_INCENTIVE] help the [FR_MEAS1] project receive implementation approval from your organization?

1. Yes
2. No

98. Don't know / Not applicable

36. Would you have completed the [FR_MEAS1] project even if you had not participated in the program?

1. Yes
2. No
98. Don't know

37. Did you have experience with I&M's energy efficiency programs before completing the [FR_MEAS1] project?

1. Yes
2. No
98. Don't know

[Display Q38 IF Q37 = 1]

38. How important was your previous experience with Indiana-Michigan-offered programs in making your decision to [INSTALL_FR1] the [FR_MEAS1] at the [LOCATION] location?

1. Very important
2. Somewhat important
3. Only slightly important
4. Not at all important
98. Don't know

[Display Q39 if Q6= 1]

39. Earlier you mentioned that [PROGRAM TA/REPRESENTATIVE] completed an onsite energy evaluation. Was the [FR_MEAS1] recommended through that onsite energy evaluation?

1. Yes
2. No
98. Don't know

[Display Q40 if Q39 = 1]

40. If the [FR_MEAS1] was not recommended as part of the onsite energy evaluation, how likely is it that you would have [INSTALLED_FR1] it anyway?

1. Definitely would have
2. Probably would have
3. Probably would not have
4. Definitely would not have
98. Don't know

41. Would your organization have been financially able to [INSTALL_FR1] the [FR_MEAS1] at the [LOCATION] without the [FINANCING_INCENTIVE] from the program?

1. Yes
2. No
98. Don't know

[Display Q42 if Q41 = 2]

42. To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program [FINANCING_INCENTIVE] was not available. Is that correct?

1. Yes
2. No
98. Don't know

43. If the [FINANCING_INCENTIVE] from the program had not been available, how likely is it that you would have [INSTALLED_FR1] the [FR_MEAS1] at the [LOCATION] location anyway?

1. Definitely would have [INSTALLED_FR1]
2. Probably would have [INSTALLED_FR1]
3. Probably would not have [INSTALLED_FR1]
4. Definitely would not have [INSTALLED_FR1]
98. Don't know

[Display if Q21 = 1]

44. How likely is it that you would have [INSTALLED_FR1] the [FR_MEAS1] if your organization had not received assistance with project design and implementation from Allumia through I&M's Energy Efficiency as a Service Program?

1. Definitely would have [INSTALLED_FR1]
2. Probably would have [INSTALLED_FR1]
3. Probably would not have [INSTALLED_FR1]
4. Definitely would not have [INSTALLED_FR1]
98. Don't know

[Display Q45 if Q41 = 2 and Q42 = 1 and Q32 = 1and Q33 = 1]

45. Previously you said that your organization had plans to complete the project and would have completed it if you had not participated in the program. You also said that your organization would not have been financially able to install the equipment without the program [FINANCING_INCENTIVE].

In your own words, can you explain the role that the financial incentive played in your decision to complete this project?

[Display Q46 IF MEASURE_QUANT > 1]

46. Did you install more [FR_MEAS1] because of the program?

1. Yes
2. No, the program did not affect quantity purchased and installed.
98. Don't know

[Display Q46 IF ENERGY_EQUIP = YES]

47. Did you install equipment that was more energy efficient because of the program?

1. Yes
2. No, the program did not affect level of efficiency chosen for equipment.
98. Don't know

[Display Q48 IF Q47 = 1]

48. What kind of equipment, if any, would you have installed if the program was not available?

1. [OPEN]
98. Don't know

49. Did you [INSTALL_FR1] the [FR_MEAS1] earlier than you otherwise would have because of program?

1. Yes
2. No, the program did not affect timing of project.
98. Don't know

[Display Q50 IF Q49= 1]

50. When would you otherwise have completed the project?

1. Less than 6 months later
2. 6-12 months later
3. 1-2 years later
4. 3-5 years later
5. More than 5 years later
98. Don't know

[Display Q51 IF MULTIPLE_MEASURE =1]

51. Our records indicate you [INSTALLED_FR2] [FR_MEAS2] at the [FR_LOC2] location in addition to [FR_MEAS1] at the [FR__LOC1] location. Did both of these projects go through the same decision making process or was a separate decision made for each?

1. The same decision making process applies to both projects.
2. A different decision making process applies to each project.
3. We did not [INSTALL_FR2] [FR_MEAS2] at the [FR_LOC2] location.
98. Don't know

[IF MULTIPLE_MEASURE =1 Q51 = 2, REPEAT Q30 THROUGH Q50 WITH FR_MEAS2]

Spillover

[NOTE: THESE QUESTIONS SERVE TO COLLECT DATA TO QUANTIFY SPILLOVER EFFECTS FROM the INCENTIVE PROGRAMS AND DIRECT IMPACTS OF THE ENERGY ASSESSMENT TOOL]

52. Since you completed the incentive project, have you installed any energy efficient equipment at a facility that receives electrical service from I&M and that you DID NOT get a rebate or discount for from I&M?

1. Yes
2. No
98. Don't know

[Display Q53 if Q52 = 1]

53. What additional energy efficient equipment have you installed?

[MULTI SELECT]

1. Lighting
2. Lighting controls or occupancy sensors
3. LED exit signs
4. Unitary or split air conditioning system or chiller
5. ENERGY STAR Room air conditioners
6. Efficient motors
7. Refrigeration equipment (including LED case lighting)
8. Kitchen equipment
9. Something else [OPEN ENDED]
96. Didn't implement any measures [SKIP TO Customer satisfaction]
98. Don't know

[Display Q54 if Q52= 1]

54. Why didn't you receive incentives for those items?

[MULTI SELECT RANDOMIZE ORDER, BUT FIX OTHER AND DON'T KNOW]

1. Didn't know whether equipment qualified for financial incentives
2. Equipment did not qualify for financial incentives
3. Too much paperwork for the financial incentive application
4. Financial incentive was insufficient
5. Didn't have time to complete paperwork for financial incentive application
6. Didn't know about financial incentives until after equipment was purchased
7. We did receive an incentive **[SKIP TO SATISFACTION]**]
8. Other (Please specify) [OPEN ENDED]
98. Don't know

[Display Q55 if Q52= 1]

55. Did you work with a contractor to install that efficient equipment or did your company's staff install the equipment?

1. Worked with a contractor
2. Company self-installed the equipment
3. Both
98. Don't know

Lighting

[Display Q56 IF Q52 = 1]

56. What type of lighting did you install? [MULTI-SELECT]

1. T8 Fluorescent linear lamps – Single (1) lamps
2. T8 Fluorescent linear lamps – 2 lamp fixtures
3. T8 Fluorescent linear lamps – 4 lamp fixtures
4. T8 Fluorescent linear lamps – 6 lamp fixtures
5. T5 Fluorescent linear lamps – Single (1) lamps
6. T5 Fluorescent linear lamps – 2 lamp fixtures
7. T5 Fluorescent linear lamps – 4 lamp fixtures
8. T5 Fluorescent linear lamps – 6 lamp fixtures
9. LED Screw-in BAR/R/ER bulbs
10. LED Screw-in Interior PAR/MR bulbs
11. LED Screw-in omnidirectional A-line bulbs
12. LED 2-foot linear replacement lamps
13. LED 4-foot linear replacement lamps
14. LED exterior flood or spot luminaires
15. LED 1x4 panel or troffer
16. LED 2x2 panel or troffer
17. LED 2x4 panel or troffer
18. LED high-bay lighting
19. Another type
98. Don't know

[Display Q57 IF Q56 = 19]

57. What other type of lighting equipment did you install?

[TEXT BOX] Lamps/Bulbs

[REPEAT Q58 - Q61 FOR EACH TYPE SELECTED IN Q56]

58. How many [Q56 RESPONSE] did you install?

[TEXT BOX] Watts

59. What was the average wattage of the [Q56 RESPONSE]?

60. Were the [Q56 RESPONSE] installed inside or outside?

1. Inside
2. Outside
3. Parking garage
98. Don't know

[Display Q61 IF Q60 = 1]

61. What type of building did you install the [Q56 RESPONSE] in?

1. Food Sales
2. Food Service
3. Health Care
4. Hotel/Motel
5. Office
6. Public Assembly
7. Public Services (non-food)
8. Retail
9. Warehouse
10. School
11. College
12. Industrial – 1 Shift
13. Industrial – 2 Shift
14. Industrial – 3 Shift
15. Other (Please describe)
98. Don't know

[Display Q62 IF Q60 = 1]

62. Is the inside space heated, cooled, or both?

1. Heated
2. Cooled
3. Both
98. Don't know

63. What type of lighting did the [Q56 RESPONSE] replace?

1. T12s (linear fluorescents)
2. T8s (linear fluorescents)
3. Metal-halide / High-intensity discharge
4. Incandescent
5. Compact fluorescent (CFL)
5. Something else [OPEN]
98. Don't know

64. What was the average wattage of the old lamps or bulbs?
65. How many of the old lamps or bulbs did you remove?

[Display Q66 if Q53 =1]

66. How important was your experience with the program in your decision to install this lighting equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q67 if Q53 =1]

67. If you had NOT participated in the program, how likely is it that your organization would still have installed this lighting equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q68 if [Q66=0,1,2,3 AND Q67=0,1,2,3]

OR IF [Q66=8,9,10 AND Q67=8,9,10]

68. You scored the importance of your program experience to your decision to implement additional lighting measures with [Q66 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing additional lighting measures if your organization had not participated in the program with [Q67 RESPONSE] out of 10 possible points.
69. Can you please explain the role the program made in your decision to implement this measure?

Lighting Controls

[Display Q70 IF Q53 = 2]

70. How many fixtures are being controlled by the lighting controls?

[Display Q71 IF Q53 = 2]

71. On average, how many lamps or bulbs does each fixture contain?

[Display Q72 IF Q53 = 2]

72. What is the average wattage of these lamps?

[Display Q73 IF Q53 = 2]

73. Are any of the lighting controls that you installed central time clock controls?

1. Yes
2. No
98. Don't know

[Display Q74 IF Q73 = 1]

74. How many of the fixtures are controlled by the central time clock?

[Display Q75 IF Q53 = 2]

75. What type of building did you install the lighting controls in?

1. Food Sales
2. Food Service
3. Health Care
4. Hotel/Motel
5. Office
6. Public Assembly
7. Public Services (non-food)
8. Retail
9. Warehouse
10. School
11. College
12. Industrial – 1 Shift
13. Industrial – 2 Shift
14. Industrial – 3 Shift
16. Other (Please specify)
98. Don't know

[Display Q76 IF Q53 = 2]

76. How important was your experience with the program in your decision to install lighting controls?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q77 if Q53 = 2]

77. If you had NOT participated in the program, how likely is it that your organization would still have installed lighting controls?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q78 if [Q76=0,1,2,3 AND Q77=0,1,2,3]

OR [Q76=8,9,10 AND Q77=8,9,10]]

78. You scored the importance of your program experience to your decision to implement lighting controls with [Q76 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing lighting controls if your organization had not participated in the program with [Q77 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

LED Exit Signs

[Display Q79 IF Q53 = 2]

79. Did you install single-sided or double-sided exit signs?

1. Single-sided
2. Double-sided
98. Don't know

[Display Q80 IF Q79 = 2]

80. How many double-sided LED exit signs did you install?

81. How many LED exit signs did you install?

82. Which of the following best describes the type of exit sign the new LED exit signs replaced?

1. Incandescent
2. CFL (Dual sided)
3. CFL (Single Sided)
98. Don't know

83. How important was your experience with the program in your decision to install LED exit signs?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q84 if Q53 = 2]

84. If you had NOT participated in the program, how likely is it that your organization would still have installed LED exit signs?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q85 if [Q83=0,1,2,3 AND Q84=0,1,2,3]

OR [Q83=8,9,10 AND Q84=8,9,10]]

85. You scored the importance of your program experience to your decision to implement lighting controls with [Q76 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing LED exit signs if your organization had not participated in the program with [Q77 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

HVAC Measures

[Display Q86 IF Q53 = 4]

86. What types of energy efficient equipment did you install as part of the HVAC project? [MULTI SELECT]

1. Split air conditioning system (An A/C system that has an evaporator indoors and the compressor and condenser outdoors.)
2. Packaged air conditioning system (A type of central air conditioning that contains both the air handler fan, compressor and condenser in a single unit. These are typically mounted on the roof.)
3. Heat pump (An electric heating and cooling system)
4. Air cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
5. Water cooled chiller (A system that produces cold liquid sent around to individual spaces used for cooling air usually found in larger facilities)
6. Another type
98. Don't know

[Display Q87 IF Q86 = 6]

87. What other type of HVAC equipment did you install?

[REPEAT Q88 – Q91 for each selected in Q86]

88. We would like to know more about the rated efficiency and number of units of the [Q86 RESPONSE](s) that you installed.
89. For each level of efficiency of the equipment you installed, please provide the rated efficiency and the number of units.
90. What type of building did you install the heating/cooling equipment in?

1. Grocery
2. High School
3. Hospital
4. Light Industrial
5. Office - Large
6. Office - Small
7. Primary School
8. Religious Worship
9. Restaurant - Fast Food

10. Restaurant - Full Service
11. Retail - Big Box
12. Retail - Large
13. Retail - Small
14. University
15. Warehouse
16. Other (Please specify)
98. Don't know

91. What city is the building where you installed the heating/cooling equipment located in?

[Display Q92 IF Q86 = 1-7]

92. How important was your experience with the program in your decision to install the energy efficient HVAC equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q93 IF Q86 = 1-7]

93. If you had NOT participated in the program, how likely is it that your organization would still have installed the energy efficient HVAC equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q94 if [Q92=0,1,2,3 AND Q93=0,1,2,3] OR [Q92=8,9,10 AND Q93=8,9,10]]

94. You scored the importance of your program experience to your decision to implement energy efficient HVAC equipment with [Q92 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing the energy efficient HVAC equipment if your organization had not participated in the program with [Q93 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

[Display Q95 IF Q53 = 4]

95. How many ENERGY STAR room air conditioners did you install?

[Display Q96 IF Q53 = 4]

96. What type of building did you install the heating/cooling equipment in?

1. Grocery
2. High School
3. Hospital
4. Light Industrial
5. Office - Large
6. Office - Small

7. Primary School
8. Religious Worship
9. Restaurant - Fast Food
10. Restaurant - Full Service
11. Retail - Big Box
12. Retail - Large
13. Retail - Small
14. University
15. Warehouse
16. Other
98. Don't know

[Display Q97 IF Q53 = 4]

97. What city is the building where you installed the room air conditioners located in?

[Display Q98 IF Q53 = 4]

98. How important was your experience with the program in your decision to install the heating/cooling equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q99 IF Q53 = 4]

99. If you had NOT participated in the program, how likely is it that your organization would still have installed the heating/cooling equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q100 if [Q98=0,1,2,3 AND Q99=0,1,2,3] OR [Q98=8,9,10 AND Q99=8,9,10]]

100. You scored the importance of your program experience to your decision to install the energy efficient air conditioners with [Q98 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of installing the energy efficient air conditioners if your organization had not participated in the program with [Q99 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

Efficient Motors

[Display Q101 IF Q53 = 5]

101. How many efficient motors did you install?

[Display Q102 IF Q53 = 5]

102. What is the approximate average horsepower of the new motors? That is, what is the average across all of the motors you installed without an incentive?

[TEXT BOX]

[Display Q103 IF Q53 = 5]

103. What is the approximate average efficiency of the new motors? That is, what is the average efficiency across all of the new motors?

[TEXT BOX] Rated efficiency (%)

[Display Q104 IF Q53 = 5]

104. On average, how many hours per day do the motors operate? That is, what the average number of hours the motors you installed operate?

[TEXT BOX] hours per day

[Display Q105 IF Q53 = 5]

105. How important was your experience with the program in your decision to install efficient motors?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q106 IF Q53 = 5]

106. If you had NOT participated in the program, how likely is it that your organization would still have installed the efficient motors?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q107 if [Q105=0,1,2,3 AND Q106=0,1,2,3] OR [Q105=8,9,10 AND Q106=8,9,10]]

107. You scored the importance of your program experience to your decision to implement efficient motors with [Q105 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing the efficient motors if your organization had not participated in the program with [Q106 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

Commercial Refrigeration Equipment

[Display Q108 IF Q53 = 6]

108. What types of energy efficient refrigeration equipment did you install?

1. ENERGY STAR Commercial freezer
2. ENERGY STAR Commercial refrigerator
3. Anti-sweat heater controls

4. LED refrigerated case lighting
5. Refrigerated case covers
6. Some other type of refrigeration equipment
98. Don't know

[Display Q109 IF Q108 = 6]

109. What other type of energy efficient refrigeration equipment did you install?

[Display Q110 IF Q108 = 1]

110. How many ENERGY STAR commercial freezers did you install?

[Display Q111 IF Q110 = 1, REPEAT FOR EACH UP TO THREE TIMES]

111. What is the volume in cubic feet of the first freezer?

[Display Q112 IF Q110 = 1, REPEAT FOR EACH UP TO THREE TIMES]

112. Does this freezer have a solid door or a glass door?

1. Solid door
2. Glass door
98. Don't know

[Display Q113 IF Q110 = 1, REPEAT FOR EACH UP TO THREE TIMES]

113. Is this a vertical freezer or a chest type freezer?

1. Vertical
2. Chest
98. Don't know

[Display Q114 IF Q108 = 2]

114. How many ENERGY STAR commercial refrigerators did you install?

[TEXT BOX] refrigerators

[Display Q115 IF Q114 = 2, REPEAT FOR EACH UP TO THREE TIMES]

115. What is the volume in cubic feet of the first refrigerator?

[TEXT BOX] cubic feet

[Display Q116 IF Q114 = 2, REPEAT FOR EACH UP TO THREE TIMES]

116. Does this refrigerator have a solid door or a glass door?

1. Solid door
2. Glass door

98. Don't know

[Display Q117 IF Q114 = 2, REPEAT FOR EACH UP TO THREE TIMES]

117. Is this a vertical refrigerator or a chest type refrigerator?

1. Vertical
2. Chest
98. Don't know

[Display Q118 IF Q108 = 3]

118. Did you install humidity-based controls or conductivity-based controls, or both types?

1. Humidity-based controls
2. Conductivity-based controls
3. Both types
98. Don't know

[Display Q119 IF Q118= 1 OR 3]

119. How many humidity-based controls did you install?

[Display Q120 IF Q118= 1 OR 3]

120. What is the total number of freezer or refrigerator doors controlled by the humidity-based controls?

[Display Q121 IF Q118= 2 OR 3]

121. How many conductivity-based controls did you install?

[Display Q122 IF Q118= 2 OR 3]

122. What is the total number of freezer or refrigerator doors controlled by the conductivity-based controls?

[Display Q123 IF Q118 = 98]

123. How many anti-sweat heater controls did you install?

[Display Q124 IF Q118 = 98]

124. What is the total number of freezer or refrigerator doors controlled by the anti-sweat heater controls?

[Display Q125 IF Q108 = 4]

125. How many linear feet in total of LED case lighting did you install?

[Display Q126 IF Q108 = 5]

126. How many linear feet of refrigerated case covers did you install?

[Display Q127 if Q53=6]

127. How important was your experience with the program in your decision to install the energy efficient refrigeration equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q128 if Q53=6]

128. If you had NOT participated in the program, how likely is it that your organization would still have installed this energy efficient refrigeration equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q129 if [Q127=0,1,2,3 AND Q128=0,1,2,3] AND [Q127=8,9,10 AND Q128=8,9,10]]

129. You scored the importance of your program experience to your decision to implement energy efficient refrigeration equipment with [Q127 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing energy efficient refrigeration equipment if your organization had not participated in the program with [Q128 RESPONSE] out of 10 possible points. Can you please explain the role the program made in your decision to implement this measure?

Commercial Kitchen Equipment

[Display Q130 IF Q53 = 7]

130. What type of kitchen equipment did you install?

1. Low flow pre-rinse spray valves
2. ENERGY STAR Commercial fryers
3. ENERGY STAR Commercial steam cookers
4. ENERGY STAR hot food holding cabinets
5. ENERGY STAR commercial griddles
6. ENERGY STAR commercial convection ovens
7. ENERGY STAR commercial combination ovens
8. Some other type of kitchen equipment

98. Don't know

[Display Q131 IF Q130 = 8]

131. What other type of kitchen equipment did you install?

[Display Q132 IF Q130 = 1]

132. Is the flow rate for any of the spray valves you installed equal to or less than 1.6 gallons per minute?

1. Yes
2. No
98. Don't know

[Display Q133 IF Q130 = 1]

133. How many pre-rinse spray valves with a flow rate equal to or less than 1.6 gallons per minute did you install?

[Display Q134 IF Q130 = 1]

134. Did you install the pre-rinse spray valves that the [LOCATION] location?

1. Yes
2. No
98. Don't know

[Display Q135 IF Q134= 2]

135. In what city is the building where you installed the pre-rinse spray valves located in?

[Display Q136 IF Q130 = 2]

136. How many ENERGY STAR commercial fryers did you install?

[Display Q137 IF Q130 = 3]

137. How many ENERGY STAR commercial steam cookers did you install?

1. Number of 3 pan steam cookers [NUMERIC]
2. Number of 4 pan steam cookers [NUMERIC]
3. Number of 5 pan steam cookers [NUMERIC]
4. Number of 6 pan steam cookers [NUMERIC]
98. Don't know

[Display Q138 IF Q130 = 4]

138. How many ENERGY STAR hot food holding cabinets did you install?

[Display Q139 IF Q130 = 5]

139. How many ENERGY STAR commercial griddles did you install?

[Display Q140 IF Q130 = 6]

140. How many ENERGY STAR commercial convection ovens did you install?

[Display Q141 IF Q130 = 7]

141. How many ENERGY STAR commercial combination ovens did you install?

[Display Q142 if Q53= 1 and Q130=1-8]

142. How important was your experience with the program in your decision to install this kitchen equipment?

[SCALE 0 "Not at all important" - 10 "Very important"]

98. Don't know

[Display Q143 if Q53= 1 and Q130=1-8]

143. If you had NOT participated in the program, how likely is it that your organization would still have installed this kitchen equipment?

[SCALE 0 "Definitely would not have installed" - 10 "Definitely would have installed"]

98. Don't know

[Display Q144 if [Q142=0,1,2,3 AND Q143=0,1,2,3] OR [Q142=8,9,10 AND Q143=8,9,10]]

144. You scored the importance of your program experience to your decision to implement energy efficient kitchen equipment with [Q142 RESPONSE] out of 10 possible points. You ALSO scored the likelihood of implementing energy efficient kitchen equipment if your organization had not participated in the program with [Q143 RESPONSE] out of 10 possible points.

145. Can you please explain the role the program made in your decision to implement this measure?

Customer Satisfaction

146. Not including any contractors that you hired, in the course of doing this project did you have any interactions with program staff about questions or concerns that you had?

1. Yes
2. No
98. (Don't know)

147. Using the scale below, please rate how dissatisfied or satisfied you are with each of the following ….

[SCALE: 1 = 1 (Very dissatisfied), 2 = 2, 3 =3, 4 = 4, 5 = 5 (Very satisfied)]

[A AND B FIRST, RANDOMIZE C - M, ASK N LAST]

a) [Display IF Q146 = 1] How long it took program staff to address your questions or concerns
b) [Display IF Q146 = 1] How thoroughly they addressed your questions or concerns
c) [Display IF SBDI = 1] The amount of time between the onsite energy assessment and the installation of the equipment
d) [Display IF SBDI = 1] The equipment that was installed
e) [Display IF SBDI = 1 OR Q17 = 2,3,4] The quality of the installation
f) [Display IF SBDI = 0] The steps you had to take to get through the program
g) [Display IF SBDI = 0 and EEaaS = 0] The amount of time it took to get your rebate or incentive
h) The range of equipment that qualifies for the program
i) [Display IF SBDI = 1] How well your SBDI Trade Ally explained the program rules and processes
j) The program overall

[Display Q148 IF ANY IN Q146 < 3]

148. Why were you dissatisfied with those parts of the program you mentioned?
149. If you could change one thing about the program, what would it be?
150. Using the same scale, how dissatisfied or satisfied are you with I&M as your electricity service provider?

[SCALE: 1 = 1 (Very dissatisfied), 2 = 2, 3 =3, 4 = 4, 5 = 5 (Very satisfied)]

Firmographic

151. Does your organization own or occupy, own and rent to someone else, or rent the facility where the project(s) took place?

1. Own and occupy
2. Own and rent to someone else
3. Rent
98. Don't know
99. Prefer not to state

152. Which best describes your facility located at [LOCATION]? Would you say this facility is…

1. Your company's only location
2. One of several locations owned by your company
3. The headquarters location of a company with several locations
98. Not sure
99. Prefer not to state

153. About how many people work at this location?

1. Less than 10
2. 10 – 25
3. 26 – 50
4. 51 – 100
5. 101- 250
6. More than 250
98. Not sure
99. Prefer not to state

154. What is the total square footage of the interior space building located at [LOCATION]? If you are not sure of the total square footage, please provide your best guess.

155. Do you have any other comments that you would like to relay to I&M about energy efficiency in the commercial and industrial sector or about their programs?

4. C&I Participant Survey Results

4.1. Work Prescriptive and Custom Survey Results

Q3 - Our records indicate that you are the main contact for the [Field-FR_MEAS_1] project completed at [Field-LOCATION]. Were you involved in the decision to complete this project?

#	Answer	%	Count
1	Yes	100.0%	44
2	No	0.0%	0
	Total	100%	44

Q5 - Has your organization completed a project that received incentives from Indiana Michigan Power before the project(s) you completed in [Field-YEAR]?

#	Answer	%	Count
1	Yes	47.7%	21
2	No	38.6%	17
3	Not sure	13.6%	6
	Total	100%	44

Q6 - How did you FIRST learn about Indiana Michigan Power's incentives for efficient equipment upgrades?

#	Answer	%	Count
1	From a Trade Ally/contractor/equipment vendor/ energy consultant	54.5%	24
2	From an Indiana Michigan Power Account Representative	4.5%	2
3	From a program representative	4.5%	2
4	From an internet search	4.5%	2
5	At an event/trade show	2.3%	1
6	Received an email blast or electronic newsletter	4.5%	2
7	Received an informational brochure	2.3%	1
8	From a program sponsored webinar	2.3%	1
9	From Indiana Michigan's website	4.5%	2
10	Friends or colleagues	4.5%	2
11	Some other way (please explain)	9.1%	4
12	Don't know	2.3%	1
	Total	100%	44

Q7 - Did [Field-PROGRAM%20TA_REPRESENTATIVE] complete an onsite energy evaluation or survey of your facility?

#	Answer	%	Count
1	Yes	27.3%	12
2	No	72.7%	32
	Total	100%	44

Q8 - Upon completion of your initial assessment, were there any energy efficiency measures recommended that you did not implement?

#	Answer	%	Count
1	No, we implemented all of the recommended measures	66.7%	8
2	Yes, there were some recommended measures that we did not install	0.0%	0
3	Don’t recall	33.3%	4
	Total	100%	12

Q9 - Which recommended measures did you not install?

#	Answer	%	Count
1	Lighting replacements	0.0%	0
2	Lighting controls	0.0%	0
3	HVAC measures	0.0%	0
4	Refrigeration measures	0.0%	0
5	Food service measures	0.0%	0
6	Compressed air measures	0.0%	0
7	Other measures not listed above (Please describe)	0.0%	0
8	Don’t recall	0.0%	0
	Total		0

Q9_9_TEXT - Other measures not listed above (Please describe) Other measures not listed above (Please describe) - Text

Q10 - Why did you not install those recommended measures?

#	Answer	%	Count
1	High initial cost	0.0%	0
2	Identifying potential areas for improvement/lack of technical knowledge	0.0%	0
3	Other investments/improvements have higher funding priority	0.0%	0
4	Long payback period/return on investment	0.0%	0
5	Unaware of available incentives for energy efficient equipment	0.0%	0
6	Lack of corporate support for energy efficiency investments	0.0%	0
7	Lack of staff time to pursue energy efficiency upgrades	0.0%	0
8	Finding a contractor/vendor with which to work	0.0%	0
9	Confusion about who to contact for information or navigating the energy efficiency program offerings	0.0%	0
10	Completing the required paperwork to receive the incentive	0.0%	0
11	Don’t own building	0.0%	0
12	Other, please specify	0.0%	0
	Total		0

Q11 - Using the scale below, please indicate how much you agree or disagree with the following statements regarding your experience with your SBDI Trade Ally:

#	Question	2		3		4		1 (Completely disagree)		5 (Completely agree)		Total
1	My SBDI Trade Ally's recommendations made sense for my business.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
2	My SBDI Trade Ally could answer my questions about the program.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
3	My SBDI Trade Ally could answer my questions about my project.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
4	I would recommend my SBDI Trade Ally as a contractor to consider.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

Q13 - Which of the following people worked on completing your application for program incentives (including gathering required documentation)?

#	Answer	%	Count
1	Yourself	56.8%	25
2	Another member of your company	6.8%	3
3	A contractor	56.8%	25
4	An equipment vendor	6.8%	3

5	A designer or architect	0.0%	0
	Total	100%	44

Q14 - Using a 5-point scale, where 1 means “completely unacceptable” and 5 means “completely acceptable,” how would you rate . . .

#	Question	Completely unacceptable1		2		3		4		Completely acceptable5		Not applicable		Total
1	the ease of finding the application on Indiana Michigan Power’s website	0.0%	0	0.0%	0	4.0%	1	12.0%	3	60.0%	15	24.0%	6	25
2	the ease of using the application portal on Indiana Michigan Power's website	0.0%	0	0.0%	0	4.0%	1	16.0%	4	40.0%	10	40.0%	10	25
3	the time it took to approve the application	0.0%	0	4.0%	1	0.0%	0	16.0%	4	76.0%	19	4.0%	1	25
4	the clarity of information on how to complete the application	0.0%	0	8.0%	2	16.0%	4	28.0%	7	48.0%	12	0.0%	0	25
5	the effort required to provide required invoices or other supporting	0.0%	0	0.0%	0	4.0%	1	32.0%	8	64.0%	16	0.0%	0	25

	documentation													
6	the overall application process	0.0%	0	0.0%	0	4.0%	1	28.0%	7	68.0%	17	0.0%	0	25

Q16 - Did you have a clear sense of whom you could go to for assistance with the application process?

#	Answer	%	Count
1	Yes	84.0%	21
2	No	16.0%	4
3	Don’t know	0.0%	0
	Total	100%	25

Q18 - Who installed your program-qualified equipment or efficiency upgrades? Was it…

#	Answer	%	Count
1	Your own staff	27.3%	12
2	A contractor you’ve worked with before	43.2%	19
3	A contractor recommended by the Indiana Michigan program (registered trade ally)	15.9%	7
4	A new contractor that someone else recommended	6.8%	3
5	Someone else (Please specify)	6.8%	3
6	Don’t know	0.0%	0
	Total	100%	44

Q24 - Has your organization purchased any significant energy efficient equipment in the last three years without applying for a financial incentive through an energy efficiency program at [Field-LOCATION]?

#	Answer	%	Count
1	Yes. Our organization purchased energy efficient equipment but did not apply for incentive.	15.9%	7
2	No. Our organization purchased significant energy efficient equipment and applied for an incentive.	15.9%	7
3	No significant energy efficient equipment was purchased by our organization.	47.7%	21
4	Don't know	20.5%	9
	Total	100%	44

Q25 - Which of the following financial methods, if any, does your organization typically use to evaluate energy efficiency improvements? (Select all that apply.)

#	Answer	%	Count
1	Initial Cost	50.0%	7
2	Simple payback	28.6%	4
3	Internal rate of return	14.3%	2
4	Life cycle cost	35.7%	5
5	We don’t use any of these	14.3%	2
6	Don’t know	7.1%	1
	Total	100%	14

Q28 - Before participating in the [Field-program_name] Program, had you implemented any equipment or measure similar to the [Field-FR_MEAS_1] [Field-IMPLEMENTED_1] at [Field-LOCATION]?

#	Answer	%	Count
1	Yes	52.3%	23
2	No	40.9%	18
3	Don’t know	6.8%	3
	Total	100%	44

Q29 - When did you first learn about I&M’s energy efficiency programs? Was it BEFORE or AFTER you finalized the specifications of your [Field-FR_MEAS_1] project, including the efficiency level and the scope of the project?

#	Answer	%	Count
1	Before	86.4%	38
2	After	11.4%	5
3	Don't know	2.3%	1
	Total	100%	44

Q30 - Did you have plans to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION] before participating in the program?

#	Answer	%	Count
1	Yes	70.5%	31
2	No	29.5%	13
3	Don’t know	0.0%	0
	Total	100%	44

Q31 - Prior to hearing about the program [Field-FINANCING_INCENTIVE], was the purchase of the [Field-FR_MEAS_1] included in your organization's capital budget?

#	Answer	%	Count
1	Yes	54.8%	17
2	No	35.5%	11
3	Don't know / Not applicable	9.7%	3
	Total	100%	31

Q32 - Had your organization ALREADY ordered or purchased the [Field-FR_MEAS_1] BEFORE you heard about the program?

#	Answer	%	Count
1	Yes	19.4%	6
2	No	77.4%	24
3	Don't know	3.2%	1
	Total	100%	31

Q33 - Did the program [Field-FINANCING_INCENTIVE] help the [Field-FR_MEAS_1] project receive implementation approval from your organization?

#	Answer	%	Count
1	Yes	81.8%	36
2	No	13.6%	6
3	Don't know / Not applicable	4.5%	2
	Total	100%	44

Q34 - Would you have completed the [Field-FR_MEAS_1] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	45.5%	20
2	No	34.1%	15
3	Don’t know	20.5%	9
	Total	100%	44

Q35 - Did you have experience with I&M’s energy efficiency programs before completing the [Field-FR_MEAS_1] project?

#	Answer	%	Count
1	Yes	40.9%	18
2	No	52.3%	23
3	Don’t know	6.8%	3
	Total	100%	44

Q36 - How important was your previous experience with Indiana-Michigan-offered programs in making your decision to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION]?

#	Answer	%	Count
1	Very important	72.2%	13
2	Somewhat important	27.8%	5
3	Only slightly important	0.0%	0
4	Not at all important	0.0%	0
5	Don't know	0.0%	0
	Total	100%	18

Q37 - Earlier you mentioned that [Field-PROGRAM%20TA_REPRESENTATIVE] completed an onsite energy evaluation. Was the [Field-FR_MEAS_1] recommended through that onsite energy evaluation?

#	Answer	%	Count
1	Yes	66.7%	8
2	No	16.7%	2
3	Don’t know	16.7%	2
	Total	100%	12

Q38 - If the [Field-FR_MEAS_1] was not recommended as part of the onsite energy evaluation, how likely is it that you would have [Field-IMPLEMENTED_1] it anyway?

#	Answer	%	Count
1	Definitely would have	12.5%	1
2	Probably would have	62.5%	5
3	Probably would not have	25.0%	2
4	Definitely would not have	0.0%	0
5	Don't know	0.0%	0
	Total	100%	8

Q39 - Would your organization have been financially able to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION] without the [Field-FINANCING_INCENTIVE] from the program?

#	Answer	%	Count
1	Yes	88.6%	39
2	No	0.0%	0
3	Don’t know	11.4%	5
	Total	100%	44

Q40 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program [Field-FINANCING_INCENTIVE] was not available. Is that correct?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q41 - If the [Field-FINANCING_INCENTIVE] from the [Field-program_name] Program had not been available, how likely is it that you would have [Field-IMPLEMENTED_1] the [Field-FR_MEAS_1] at [Field-LOCATION] anyway?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	29.5%	13
2	Probably would have ${e://Field/IMPLEMENTED_1}	36.4%	16
3	Probably would not have ${e://Field/IMPLEMENTED_1}	15.9%	7
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	13.6%	6
5	Don't know	4.5%	2
	Total	100%	44

Q42 - How likely is it that you would have [Field-IMPLEMENTED_1] the [Field-FR_MEAS_1] if your organization had not received assistance with project design and implementation from Allumia through I&M's Energy Efficiency as a Service Program?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	0.0%	0
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q44 - Did you install more [Field-FR_MEAS_1] because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect quantity purchased and installed.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q45 - Did you install equipment that was more energy efficient because of the program?

#	Answer	%	Count
1	Yes	50.0%	2
2	No, program did not affect level of efficiency chosen for equipment.	25.0%	1
3	Don't know	25.0%	1
	Total	100%	4

Q46 - What kind of equipment, if any, would you have installed if the program was not available?

#	Answer	%	Count
1	Please specify	50.0%	1
2	Don't know	50.0%	1
	Total	100%	2

Q47 - Did you [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	52.3%	23
2	No, program did not affect timing of project.	36.4%	16
3	Don’t know	11.4%	5
	Total	100%	44

Q48 - When would you otherwise have completed the project?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	21.7%	5
3	1-2 years later	34.8%	8
4	3-5 years later	8.7%	2
5	More than 5 years later	8.7%	2
6	Don’t know	26.1%	6
	Total	100%	23

Q49 - Our records indicate you [Field-IMPLEMENT_2] [Field-FR_MEAS_2] at [Field-LOCATION] in addition to [Field-FR_MEAS_1] at [Field-LOCATION]. Did both of these projects go through the same decision making process or was a separate decision made for each?

#	Answer	%	Count
1	The same decision making process applies to both projects.	40.0%	2
2	A different decision making process applies to each project.	60.0%	3
3	We did not ${e://Field/IMPLEMENT_2} ${e://Field/FR_MEAS_2} at the ${e://Field/LOCATION}	0.0%	0
4	Don't know	0.0%	0
	Total	100%	5

Q50 - Before participating in the [Field-program_name] Program, had you implemented any equipment or measure similar to the [Field-FR_MEAS_2] [Field-IMPLEMENTED_2] at [Field-LOCATION]?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total	100%	3

Q51 - When did you first learn about I&M's energy efficiency programs? Was it BEFORE or AFTER you finalized the specifications of your [Field-FR_MEAS_2] project, including the efficiency level and the scope of the project?

#	Answer	%	Count
1	Before	100.0%	3
2	After	0.0%	0
3	Don't know	0.0%	0
	Total	100%	3

Q52 - Did you have plans to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION] before participating in the program?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
3	Don't know	0.0%	0
	Total	100%	3

Q53 - Prior to hearing about the program [Field-FINANCING_INCENTIVE], was the purchase of the [Field-FR_MEAS_2] included in your organization's capital budget?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	3
3	Don't know / Not applicable	0.0%	0
	Total	100%	3

Q54 - Had your organization ALREADY ordered or purchased the [Field-FR_MEAS_2] BEFORE you heard about the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	3
3	Don’t know	0.0%	0
	Total	100%	3

Q55 - Did the program [Field-FINANCING_INCENTIVE] help the [Field-FR_MEAS_2] project receive implementation approval from your organization?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	66.7%	2
3	Don’t know / Not applicable	0.0%	0
	Total	100%	3

Q56 - Would you have completed the [Field-FR_MEAS_2] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	66.7%	2
2	No	0.0%	0
3	Don’t know	33.3%	1
	Total	100%	3

Q57 - Did you have experience with I&M's energy efficiency programs before completing the [Field-FR_MEAS_2] project?

#	Answer	%	Count
1	Yes	66.7%	2
2	No	33.3%	1
3	Don't know	0.0%	0
	Total	100%	3

Q58 - How important was your previous experience with Indiana-Michigan-offered programs in making your decision to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION]?

#	Answer	%	Count
1	Very important	0.0%	0
2	Somewhat important	50.0%	1
3	Only slightly important	50.0%	1
4	Not at all important	0.0%	0
5	Don't know	0.0%	0
	Total	100%	2

Q59 - Was the [Field-FR_MEAS_2] recommended through that onsite energy evaluation?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q60 - If the [Field-FR_MEAS_2] was not recommended as part of the onsite energy evaluation, how likely is it that you would have [Field-IMPLEMENTED_2] it anyway?

#	Answer	%	Count
1	Definitely would have	0.0%	0
2	Probably would have	0.0%	0
3	Probably would not have	0.0%	0
4	Definitely would not have	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q61 - Would your organization have been financially able to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION] without the [Field-FINANCING_INCENTIVE] from the program?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total	100%	3

Q62 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q63 - If the [Field-FINANCING_INCENTIVE] from the [Field-program_name] Program had not been available, how likely is it that you would have [Field-IMPLEMENTED_2] the [Field-FR_MEAS_2] at [Field-LOCATION] anyway?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	66.7%	2
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	33.3%	1
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total	100%	3

Q64 - How likely is it that you would have [Field-IMPLEMENTED_2] the [Field-FR_MEAS_2] if your organization had not received assistance with project design and implementation from Allumia through I&M's Energy Efficiency as a Service Program?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	0.0%	0
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q66 - Did you install more [Field-FR_MEAS_2] than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect quantity purchased and installed.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q67 - Did you install equipment that was more energy efficient because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect level of efficiency chosen for equipment.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q68 - What kind of equipment, if any, would you have installed if the program was not available?

#	Answer	%	Count
1	Please specify	0.0%	0
	Total		0

Q69 - Did you [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	66.7%	2
2	No, program did not affect timing of project.	33.3%	1
3	Don’t know	0.0%	0
	Total	100%	3

Q70 - When would you otherwise have completed the project?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	0.0%	0
3	1-2 years later	100.0%	2
4	3-5 years later	0.0%	0
5	More than 5 years later	0.0%	0
6	Don’t know	0.0%	0
	Total	100%	2

Q165 - Not including any contractors that you hired, in the course of doing this project did you have any interactions with program staff about questions or concerns that you had?

#	Answer	%	Count
1	Yes	31.7%	13
2	No	68.3%	28
3	Don’t know	0.0%	0
	Total	100%	41

Q166 - Using the scale below, please rate how dissatisfied or satisfied you are with each of the following ….

#	Question	Very dissatisfied1		2		3		4		Very satisfied5		Don't know		Total
1	How long it took program staff to address your questions or concerns	0.0%	0	0.0%	0	7.7%	1	0.0%	0	92.3%	12	0.0%	0	13
2	How thoroughly they addressed your questions or concerns	0.0%	0	0.0%	0	7.7%	1	0.0%	0	92.3%	12	0.0%	0	13
3	The amount of time between the onsite audit and the installation of the equipment	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined
4	The equipment that was installed	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined

5	The quality of the installation	0.0%	0	0.0%	0	3.6%	1	7.1%	2	85.7%	24	3.6%	1	28
6	The steps you had to take to get through the program	0.0%	0	0.0%	0	4.8%	2	19.0%	8	69.0%	29	7.1%	3	42
7	The amount of time it took to get your rebate or incent	0.0%	0	2.4%	1	0.0%	0	16.7%	7	59.5%	25	21.4%	9	42
8	The range of equipment that qualifies for incentives	0.0%	0	0.0%	0	9.5%	4	14.3%	6	59.5%	25	16.7%	7	42
9	How well your SBDI Trade Ally explained the program rules and processes	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined
10	The program overall	0.0%	0	0.0%	0	2.4%	1	21.4%	9	73.8%	31	2.4%	1	42

Q169 - Using the same scale, how dissatisfied or satisfied are you with I&M as your electricity service provider?

#	Answer	%	Count
1	Very dissatisfied1	0.0%	0
2	2	0.0%	0
3	3	0.0%	0
4	4	20.0%	8
5	Very satisfied5	75.0%	30
6	Don't know	5.0%	2
	Total	100%	40

Q170 - Does your organization own or occupy, own and rent to someone else, or rent the facility where the project(s) took place?

#	Answer	%	Count
1	Own and occupy	85.0%	34
2	Own and rent to someone else	7.5%	3
3	Rent	2.5%	1
4	Don’t know	5.0%	2
	Total	100%	40

Q171 - Which best describes your facility located at [Field-LOCATION]? Would you say that this facility is...

#	Answer	%	Count
1	Your company's only location	37.5%	15
2	One of several locations owned by your company	57.5%	23
3	The headquarters location of a company with several locations	0.0%	0
4	Not sure	0.0%	0
5	Prefer not to state	5.0%	2
	Total	100%	40

Q172 - About how many people work at this location?

#	Answer	%	Count
1	Less than 10	22.5%	9
2	10 - 25	7.5%	3
3	26- 50	15.0%	6
4	51- 100	15.0%	6
5	101-250	20.0%	8
6	More than 250	12.5%	5
7	Not sure	2.5%	1
8	Prefer not to state	5.0%	2
	Total	100%	40

4.2. Work Direct Install Survey Results

Q3 - Our records indicate that you are the main contact for the [Field-FR_MEAS_1] project completed at [Field-LOCATION]. Were you involved in the decision to complete this project?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
	Total	100%	3

Q5 - Has your organization completed a project that received incentives from Indiana Michigan Power before the project(s) you completed in [Field-YEAR]?

#	Answer	%	Count
1	Yes	66.7%	2
2	No	33.3%	1
3	Not sure	0.0%	0
	Total	100%	3

Q6 - How did you FIRST learn about Indiana Michigan Power's incentives for efficient equipment upgrades?

#	Answer	%	Count
1	From a Trade Ally/contractor/equipment vendor/ energy consultant	33.3%	1
2	From an Indiana Michigan Power Account Representative	0.0%	0
3	From a program representative	0.0%	0
4	From an internet search	66.7%	2
5	At an event/trade show	0.0%	0
6	Received an email blast or electronic newsletter	0.0%	0
7	Received an informational brochure	0.0%	0
8	From a program sponsored webinar	0.0%	0
9	From Indiana Michigan's website	0.0%	0
10	Friends or colleagues	0.0%	0
11	Some other way (please explain)	0.0%	0
12	Don't know	0.0%	0
	Total	100%	3

Q7 - Did [Field-PROGRAM%20TA_REPRESENTATIVE] complete an onsite energy evaluation or survey of your facility?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	66.7%	2
	Total	100%	3

Q8 - Upon completion of your initial assessment, were there any energy efficiency measures recommended that you did not implement?

#	Answer	%	Count
1	No, we implemented all of the recommended measures	100.0%	1
2	Yes, there were some recommended measures that we did not install	0.0%	0
3	Don’t recall	0.0%	0
	Total	100%	1

Q9 - Which recommended measures did you not install?

#	Answer	%	Count
1	Lighting replacements	0.0%	0
2	Lighting controls	0.0%	0
3	HVAC measures	0.0%	0
4	Refrigeration measures	0.0%	0
5	Food service measures	0.0%	0
6	Compressed air measures	0.0%	0
7	Other measures not listed above (Please describe)	0.0%	0
8	Don’t recall	0.0%	0
	Total		0

Q10 - Why did you not install those recommended measures?

#	Answer	%	Count
1	High initial cost	0.0%	0
2	Identifying potential areas for improvement/lack of technical knowledge	0.0%	0
3	Other investments/improvements have higher funding priority	0.0%	0
4	Long payback period/return on investment	0.0%	0
5	Unaware of available incentives for energy efficient equipment	0.0%	0
6	Lack of corporate support for energy efficiency investments	0.0%	0
7	Lack of staff time to pursue energy efficiency upgrades	0.0%	0
8	Finding a contractor/vendor with which to work	0.0%	0
9	Confusion about who to contact for information or navigating the energy efficiency program offerings	0.0%	0
10	Completing the required paperwork to receive the incentive	0.0%	0
11	Don’t own building	0.0%	0
12	Other, please specify	0.0%	0
	Total		0

Q11 - Using the scale below, please indicate how much you agree or disagree with the following statements regarding your experience with your SBDI Trade Ally:

#	Question	1 (Completely disagree)				2		3		4		5 (Completely agree)		Total
1	My SBDI Trade Ally's recommendations made sense for my business.	0.0%	0			0.0%	0	0.0%	0	50.0%	1	50.0%	1	2
2	My SBDI Trade Ally could answer my questions about the program.	0.0%	0			0.0%	0	0.0%	0	33.3%	1	66.7%	2	3
3	My SBDI Trade Ally could answer my questions about my project.	0.0%	0			0.0%	0	33.3%	1	0.0%	0	66.7%	2	3
4	I would recommend my SBDI Trade Ally as a contractor to consider.	0.0%	0			0.0%	0	0.0%	0	0.0%	0	100.0%	3	3

Q13 - Which of the following people worked on completing your application for program incentives (including gathering required documentation)?

#	Answer	%	Count
1	Yourself	0.0%	0
2	Another member of your company	0.0%	0
3	A contractor	0.0%	0
4	An equipment vendor	0.0%	0
5	A designer or architect	0.0%	0
	Total		0

Q14 - Using a 5-point scale, where 1 means “completely unacceptable” and 5 means “completely acceptable,” how would you rate . . .

#	Question	Completely unacceptable1			2		3		4		Completely acceptable5		Not applicable		Total
1	the ease of finding the application on Indiana Michigan Power’s website	0.0%	0		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
2	the ease of using the application portal on Indiana Michigan Power's website	0.0%	0		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
3	the time it took to approve the application	0.0%	0		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
4	the clarity of information on how to complete the application	0.0%	0		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
5	the effort required to provide required	0.0%	0		0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

	invoices or other supporting documentation															
6	the overall application process	0.0%	0			0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

Q16 - Did you have a clear sense of whom you could go to for assistance with the application process?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q17 – How long did you have to wait for the equipment to be installed after the on site assessment was performed? Would you say…

#	Answer	%	Count
1	Less than 1 week	0.0%	0
2	1-2 weeks	33.3%	1
3	3-4 weeks	0.0%	0
4	5-6 weeks	0.0%	0
5	More than 6 weeks	33.3%	1
6	All equipment was installed the same day	0.0%	0
7	Don’t know	33.3%	1
	Total	100%	3

Q18 - Who installed your program-qualified equipment or efficiency upgrades? Was it…

#	Answer	%	Count
1	Your own staff	0.0%	0
2	A contractor you've worked with before	0.0%	0
3	A contractor recommended by the Indiana Michigan program (registered trade ally)	0.0%	0
4	A new contractor that someone else recommended	0.0%	0
5	Someone else (Please specify)	0.0%	0
6	Don't know	0.0%	0
	Total		0

Q19 - Our records say that you worked with I&M's Energy Efficiency as a Service Program. Through this program, Allumia provides design, financing, and implementation assistance. Did your organization work with the Energy Efficiency as a Service Program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Not sure	0.0%	0
	Total		0

Q20 - Which aspect of the Energy Efficiency as a Service were the most important benefits to you when you were considering the service? Please select up to two options.

#	Answer	%	Count
1	Project financing	0.0%	0
2	Project management	0.0%	0
3	The system maintenance provided	0.0%	0
4	System design services	0.0%	0
5	Installation services	0.0%	0
6	Something else	0.0%	0
	Total		0

Q22 - How satisfied are you with the following aspects of the Energy Efficiency as a Service Program?

#	Question	1 (Very dissatisfied)		2		3		4		5 (Very satisfied)		Total
1	The information you received on how the service works.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
2	The financing provided through the program.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
3	The process of installing the energy-saving equipment.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
4	The process of installing the metering system.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0
5	The information you receive about the performance of the project.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

6	The impact on your electricity bill.	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0

Q24 - Has your organization purchased any significant energy efficient equipment in the last three years without applying for a financial incentive through an energy efficiency program at [Field-LOCATION]?

#	Answer	%	Count
1	Yes. Our organization purchased energy efficient equipment but did not apply for incentive.	0.0%	0
2	No. Our organization purchased significant energy efficient equipment and applied for an incentive.	33.3%	1
3	No significant energy efficient equipment was purchased by our organization.	66.7%	2
4	Don't know	0.0%	0
	Total	100%	3

Q25 - Which of the following financial methods, if any, does your organization typically use to evaluate energy efficiency improvements? (Select all that apply.)

#	Answer	%	Count
1	Initial Cost	100.0%	1
2	Simple payback	0.0%	0
3	Internal rate of return	0.0%	0
4	Life cycle cost	100.0%	1
5	We don’t use any of these	0.0%	0
6	Don’t know	0.0%	0
	Total	100%	1

Q28 - Before participating in the [Field-program_name] Program, had you implemented any equipment or measure similar to the [Field-FR_MEAS_1] [Field-IMPLEMENTED_1] at [Field-LOCATION]?

#	Answer	%	Count
1	Yes	66.7%	2
2	No	33.3%	1
3	Don’t know	0.0%	0
	Total	100%	3

Q29 - When did you first learn about I&M’s energy efficiency programs? Was it BEFORE or AFTER you finalized the specifications of your [Field-FR_MEAS_1] project, including the efficiency level and the scope of the project?

#	Answer	%	Count
1	Before	100.0%	3
2	After	0.0%	0
3	Don't know	0.0%	0
	Total	100%	3

Q30 - Did you have plans to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION] before participating in the program?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
3	Don't know	0.0%	0
	Total	100%	3

Q31 - Prior to hearing about the program [Field-FINANCING_INCENTIVE], was the purchase of the [Field-FR_MEAS_1] included in your organization's capital budget?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	66.7%	2
3	Don't know / Not applicable	0.0%	0
	Total	100%	3

Q32 - Had your organization ALREADY ordered or purchased the [Field-FR_MEAS_1] BEFORE you heard about the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	100.0%	3
3	Don't know	0.0%	0
	Total	100%	3

Q33 - Did the program [Field-FINANCING_INCENTIVE] help the [Field-FR_MEAS_1] project receive implementation approval from your organization?

#	Answer	%	Count
1	Yes	100.0%	3
2	No	0.0%	0
3	Don’t know / Not applicable	0.0%	0
	Total	100%	3

Q34 - Would you have completed the [Field-FR_MEAS_1] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	33.3%	1
3	Don’t know	33.3%	1
	Total	100%	3

Q35 - Did you have experience with I&M’s energy efficiency programs before completing the [Field-FR_MEAS_1] project?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	66.7%	2
3	Don’t know	0.0%	0
	Total	100%	3

Q36 - How important was your previous experience with Indiana-Michigan-offered programs in making your decision to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION]?

#	Answer	%	Count
1	Very important	100.0%	1
2	Somewhat important	0.0%	0
3	Only slightly important	0.0%	0
4	Not at all important	0.0%	0
5	Don't know	0.0%	0
	Total	100%	1

Q37 - Earlier you mentioned that [Field-PROGRAM%20TA_REPRESENTATIVE] completed an onsite energy evaluation. Was the [Field-FR_MEAS_1] recommended through that onsite energy evaluation?

#	Answer	%	Count
1	Yes	100.0%	1
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total	100%	1

Q38 - If the [Field-FR_MEAS_1] was not recommended as part of the onsite energy evaluation, how likely is it that you would have [Field-IMPLEMENTED_1] it anyway?

#	Answer	%	Count
1	Definitely would have	0.0%	0
2	Probably would have	0.0%	0
3	Probably would not have	100.0%	1
4	Definitely would not have	0.0%	0
5	Don't know	0.0%	0
	Total	100%	1

Q39 - Would your organization have been financially able to [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] at [Field-LOCATION] without the [Field-FINANCING_INCENTIVE] from the program?

#	Answer	%	Count
1	Yes	66.7%	2
2	No	0.0%	0
3	Don’t know	33.3%	1
	Total	100%	3

Q40 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program [Field-FINANCING_INCENTIVE] was not available. Is that correct?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q41 - If the [Field-FINANCING_INCENTIVE] from the [Field-program_name] Program had not been available, how likely is it that you would have [Field-IMPLEMENTED_1] the [Field-FR_MEAS_1] at [Field-LOCATION] anyway?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	33.3%	1
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	66.7%	2
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total	100%	3

Q42 - How likely is it that you would have [Field-IMPLEMENTED_1] the [Field-FR_MEAS_1] if your organization had not received assistance with project design and implementation from Allumia through I&M's Energy Efficiency as a Service Program?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	0.0%	0
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q44 - Did you install more [Field-FR_MEAS_1] because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect quantity purchased and installed.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q45 - Did you install equipment that was more energy efficient because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect level of efficiency chosen for equipment.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q46 - What kind of equipment, if any, would you have installed if the program was not available?

#	Answer	%	Count
1	Please specify	0.0%	0
2	Don't know	0.0%	0
	Total		0

Q47 - Did you [Field-IMPLEMENT_1] the [Field-FR_MEAS_1] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	66.7%	2
2	No, program did not affect timing of project.	33.3%	1
3	Don’t know	0.0%	0
	Total	100%	3

Q48 - When would you otherwise have completed the project?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	50.0%	1
3	1-2 years later	0.0%	0
4	3-5 years later	0.0%	0
5	More than 5 years later	0.0%	0
6	Don’t know	50.0%	1
	Total	100%	2

Q49 - Our records indicate you [Field-IMPLEMENT_2] [Field-FR_MEAS_2] at [Field-LOCATION] in addition to [Field-FR_MEAS_1] at [Field-LOCATION]. Did both of these projects go through the same decision making process or was a separate decision made for each?

#	Answer	%	Count
1	The same decision making process applies to both projects.	100.0%	1
2	A different decision making process applies to each project.	0.0%	0
3	We did not ${e://Field/IMPLEMENT_2} ${e://Field/FR_MEAS_2} at the ${e://Field/LOCATION}	0.0%	0
4	Don't know	0.0%	0
	Total	100%	1

Q50 - Before participating in the [Field-program_name] Program, had you implemented any equipment or measure similar to the [Field-FR_MEAS_2] [Field-IMPLEMENTED_2] at [Field-LOCATION]?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q51 - When did you first learn about I&M’s energy efficiency programs? Was it BEFORE or AFTER you finalized the specifications of your [Field-FR_MEAS_2] project, including the efficiency level and the scope of the project?

#	Answer	%	Count
1	Before	0.0%	0
2	After	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q52 - Did you have plans to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION] before participating in the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q53 - Prior to hearing about the program [Field-FINANCING_INCENTIVE], was the purchase of the [Field-FR_MEAS_2] included in your organization's capital budget?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don't know / Not applicable	0.0%	0
	Total		0

Q54 - Had your organization ALREADY ordered or purchased the [Field-FR_MEAS_2] BEFORE you heard about the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q55 - Did the program [Field-FINANCING_INCENTIVE] help the [Field-FR_MEAS_2] project receive implementation approval from your organization?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don't know / Not applicable	0.0%	0
	Total		0

Q56 - Would you have completed the [Field-FR_MEAS_2] project even if you had not participated in the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q57 - Did you have experience with I&M’s energy efficiency programs before completing the [Field-FR_MEAS_2] project?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q58 - How important was your previous experience with Indiana-Michigan-offered programs in making your decision to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION]?

#	Answer	%	Count
1	Very important	0.0%	0
2	Somewhat important	0.0%	0
3	Only slightly important	0.0%	0
4	Not at all important	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q59 - Was the [Field-FR_MEAS_2] recommended through that onsite energy evaluation?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q60 - If the [Field-FR_MEAS_2] was not recommended as part of the onsite energy evaluation, how likely is it that you would have [Field-IMPLEMENTED_2] it anyway?

#	Answer	%	Count
1	Definitely would have	0.0%	0
2	Probably would have	0.0%	0
3	Probably would not have	0.0%	0
4	Definitely would not have	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q61 - Would your organization have been financially able to [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] at [Field-LOCATION] without the [Field-FINANCING_INCENTIVE] from the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q62 - To confirm, your organization would NOT have allocated the funds to complete a similar energy saving project if the program incentive was not available. Is that correct?

#	Answer	%	Count
1	Yes	0.0%	0
2	No	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q63 - If the [Field-FINANCING_INCENTIVE] from the [Field-program_name] Program had not been available, how likely is it that you would have [Field-IMPLEMENTED_2] the [Field-FR_MEAS_2] at [Field-LOCATION] anyway?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	0.0%	0
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q64 - How likely is it that you would have [Field-IMPLEMENTED_2] the [Field-FR_MEAS_2] if your organization had not received assistance with project design and implementation from Allumia through I&M's Energy Efficiency as a Service Program?

#	Answer	%	Count
1	Definitely would have ${e://Field/IMPLEMENTED_1}	0.0%	0
2	Probably would have ${e://Field/IMPLEMENTED_1}	0.0%	0
3	Probably would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
4	Definitely would not have ${e://Field/IMPLEMENTED_1}	0.0%	0
5	Don't know	0.0%	0
	Total		0

Q66 - Did you install more [Field-FR_MEAS_2] than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect quantity purchased and installed.	0.0%	0
3	Don't know	0.0%	0
	Total		0

Q67 - Did you install equipment that was more energy efficient because of the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect level of efficiency chosen for equipment.	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q68 - What kind of equipment, if any, would you have installed if the program was not available?

#	Answer	%	Count
1	Please specify	0.0%	0
	Total		0

Q69 - Did you [Field-IMPLEMENT_2] the [Field-FR_MEAS_2] earlier than you otherwise would have without the program?

#	Answer	%	Count
1	Yes	0.0%	0
2	No, program did not affect timing of project.	0.0%	0
3	Don’t know	0.0%	0
	Total		0

Q70 - When would you otherwise have completed the project?

#	Answer	%	Count
1	Less than 6 months later	0.0%	0
2	6-12 months later	0.0%	0
3	1-2 years later	0.0%	0
4	3-5 years later	0.0%	0
5	More than 5 years later	0.0%	0
6	Don’t know	0.0%	0
	Total		0

Q165 - Not including any contractors that you hired, in the course of doing this project did you have any interactions with program staff about questions or concerns that you had?

#	Answer	%	Count
1	Yes	33.3%	1
2	No	66.7%	2
3	Don’t know	0.0%	0
	Total	100%	3

Q166 - Using the scale below, please rate how dissatisfied or satisfied you are with each of the following ….

#	Question	Very dissatisfied1		2		3		4		Very satisfied5		Don't know		Total
1	How long it took program staff to address your questions or concerns	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	1	0.0%	0	1
2	How thoroughly they addressed your questions or concerns	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	1	0.0%	0	1
3	The amount of time between the onsite audit and the installation of the equipment	0.0%	0	0.0%	0	0.0%	0	0.0%	0	66.7%	2	33.3%	1	3
4	The equipment that was installed	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	3	0.0%	0	3

5	The quality of the installation	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	3	0.0%	0	3
6	The steps you had to take to get through the program	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined
7	The amount of time it took to get your rebate or incent	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	undefined
8	The range of equipment that qualifies for incentives	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	3	0.0%	0	3
9	How well your SBDI Trade Ally explained the program rules and processes	0.0%	0	0.0%	0	0.0%	0	33.3%	1	66.7%	2	0.0%	0	3
10	The program overall	0.0%	0	0.0%	0	0.0%	0	0.0%	0	100.0%	3	0.0%	0	3

Q169 - Using the same scale, how dissatisfied or satisfied are you with I&M as your electricity service provider?

#	Answer	%	Count
2	2	0.0%	0
3	3	0.0%	0
4	4	0.0%	0
4	Very dissatisfied1	0.0%	0
5	Very satisfied5	100.0%	3
6	Don't know	0.0%	0
	Total	100%	3

Q170 - Does your organization own or occupy, own and rent to someone else, or rent the facility where the project(s) took place?

#	Answer	%	Count
1	Own and occupy	0.0%	0
2	Own and rent to someone else	66.7%	2
3	Rent	33.3%	1
4	Don’t know	0.0%	0
	Total	100%	3

Q171 - Which best describes your facility located at [Field-LOCATION]? Would you say that this facility is...

#	Answer	%	Count
1	Your company's only location	33.3%	1
2	One of several locations owned by your company	66.7%	2
3	The headquarters location of a company with several locations	0.0%	0
4	Not sure	0.0%	0
5	Prefer not to state	0.0%	0
	Total	100%	3

Q172 - About how many people work at this location?

#	Answer	%	Count
1	Less than 10	33.3%	1
2	10 - 25	0.0%	0
3	26- 50	0.0%	0
4	51- 100	0.0%	0
5	101-250	0.0%	0
6	More than 250	33.3%	1
7	Not sure	33.3%	1
8	Prefer not to state	0.0%	0
	Total	100%	3