STATE OF INDIANA

INDIANA UTILITY REGULATORY COMMISSION

IN THE MATTER OF THE VERIFIED PETITION OF INDIANAPOLIS POWER & LIGHT FOR APPROVAL OF DEMAND SIDE MANAGEMENT (DSM) PLAN, INCLUDING ENERGY EFFICIENCY (EE) PROGRAMS, AND ASSOCIATED ACCOUNTING AND RATEMAKING TREATMENT, INCLUDING TIMELY RECOVERY, THROUGH IPL'S EXISTING STANDARD CONTRACT RIDER NO. 22, OF ASSOCIATED COSTS INCLUDING PROGRAM OPERATING COSTS, NET LOST REVENUE, AND FINANCIAL INCENTIVES.	)	**CAUSE NO. 45370**

SUBMISSION OF DSM EVALUATION REPORT (Volume 1)

Petitioner, Indianapolis Power & Light Company d/b/a AES Indiana, by counsel, hereby submits its 2020 DSM Evaluation Report.

Respectfully submitted,

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing was served this 25th day of June, 2020, by email transmission, hand delivery or United States Mail, first class, postage prepaid to:

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CADMUS

2020 Demand-Side Management Portfolio Evaluation Report

June 23, 2021

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ILLUME

INTEGRAL ANALYTICS

Table of Contents

Acronyms and Abbreviations

Abbreviation	Definition
AC	Air conditioning
AMI	Advanced metering infrastructure
AOH	Annual operating hours
ARCA	Appliance Recycling Centers of America, Inc.
ARP	Appliance Recycling program
ASHP	Air-source heat pump
BAS	Building automation systems
C&I	Commercial and industrial
CBL program	Community Based Lighting program
Central AC	Central air conditioning
CDD	Cooling degree day
CDH	Cooling degree hours
CFM	Cubic feet per minute
DHW	Domestic hot water
D-in-D	Difference-in-differences
DSM	Demand-side management
EISA	Energy Independence and Security Act
EM&V	Evaluation, measurement, and verification
EUL	Effective useful life
EV	Electric vehicle
HBA	High bill alert
HDD	Heating degree day
HEW	Home energy worksheet
Indiana TRM (v2.2)	Indiana Technical Reference Manual Version 2.2
IPL	Indianapolis Power & Light
IQW program	Income Qualified Weatherization program
ISR	In-service rate
L+G	Landis+Gyr
MFDI program	Multifamily Direct Install program
M&V	Measurement and verification
NEF	National Energy Foundation
NPV	Net present value
NTG	Net-to-gross
PCT	Participant cost test
PPS	Probability proportional to size
RIM	Ratepayer impact measure test
ROI	Return on investment
Room AC	Room air conditioning
SBDI program	Small Business Direct Install program
SCT	Societal cost test
TMY3	Typical meteorological year
TRC	Total resource cost test
TRM	Technical reference manual
UCT	Utility cost test
UEC	Unit energy consumption
UMP	*Uniform Methods Project*
VFD	Variable frequency drive
WHF	Waste heat factor

Introduction

THE EVALUATION TEAM CONDUCTED IMPACT AND PROCESS EVALUATIONS OF THE INDIANAPOLIS POWER & LIGHT (IPL) 2020 DEMAND-SIDE MANAGEMENT (DSM) PORTFOLIO OF PROGRAMS:

- Three commercial and industrial (C&I) programs
- Eight residential programs
- One demand response program offered to both the commercial and residential sectors

Led by Cadmus and supported by subcontractors ILLUME Advising and Integral Analytics, the evaluation team followed guidelines presented in the IPL Evaluation Framework, approved by the IPL Oversight Board in June 2015. In February 2021, IPL became known as AES Indiana. For the purposes of this report, IPL will continue to be used (since the company name change occurred after the program year concluded).

In 2020, IPL was in the third year of a three-year program cycle and continued to work with CLEAResult, Appliance Recycling Centers of America, Inc. (ARCA), Heapy, National Energy Foundation (NEF), Oracle, and Uplight to implement and manage the suite of DSM programs. This report presents key findings from the evaluation team's assessment of program year 2020, including gross and net savings impacts, program performance, operations, and improvement opportunities.

Overall, the combined residential and C&I sectors achieved 135,068,684 kWh in net energy savings and 53,664 kW in net demand reduction, achieving 106% of the portfolio net energy-savings goal and 83% of the portfolio net demand reduction goal.

Portfolio Performance and Insights

THIS SECTION DETAILS THE PROGRAM AND PORTFOLIO SAVINGS ACHIEVEMENTS RELATIVE TO SEVERAL MEASUREMENTS:

- Goals for energy savings, demand reduction, and participation
- Audited, verified, *ex post* gross, and *ex post* net savings achievements
- Each program's contribution to portfolio savings

Figure 1 illustrates the high-level results of IPL's DSM portfolio. Figure 2 and Figure 3 show the residential and C&I sector results, respectively. The implementation continuity and sustained interest from residential customers would have led to strong performance in the residential sector, if not for the COVID-19 pandemic. The pandemic curtailed core program offerings such as in-person home audits and direct installations for some programs. As a result, residential net savings decreased by 30% from 2019 savings levels. C&I performance decreased as well, though not as substantial as in the residential sector due to continued strong performance and project pipeline from all commercial programs.

Figure 1. 2020 Portfolio-Level Results

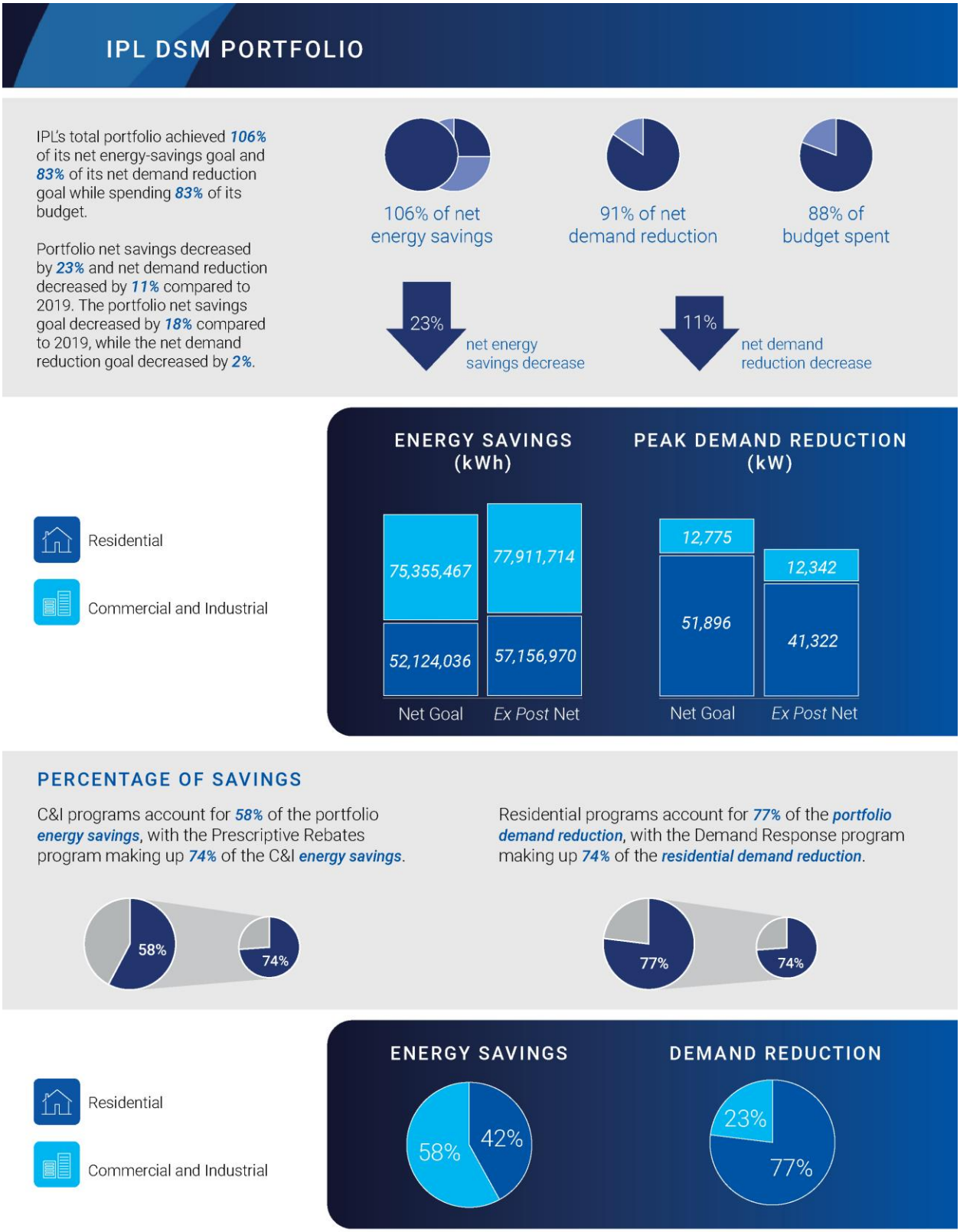


Figure 2. 2020 Residential Sector Results

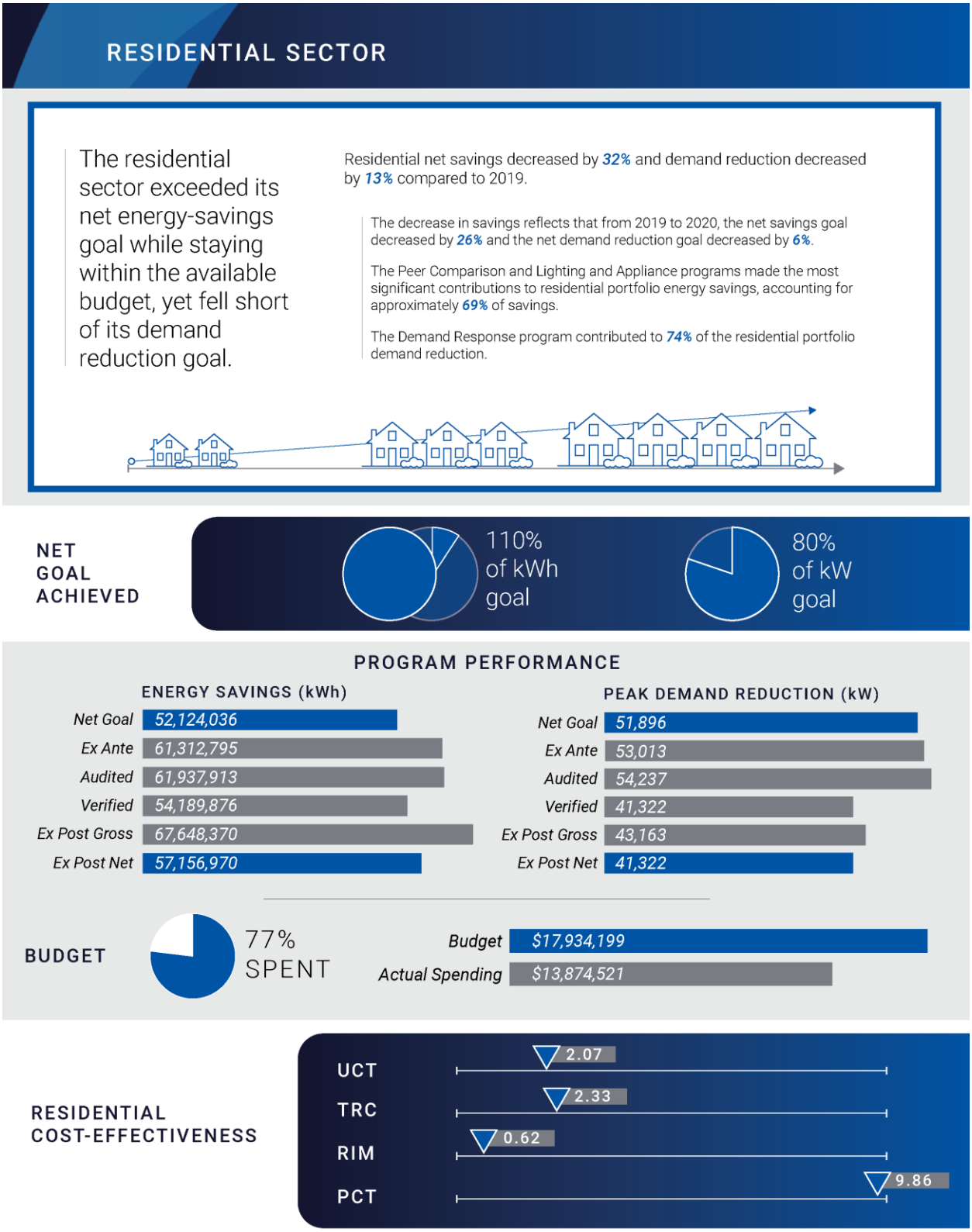
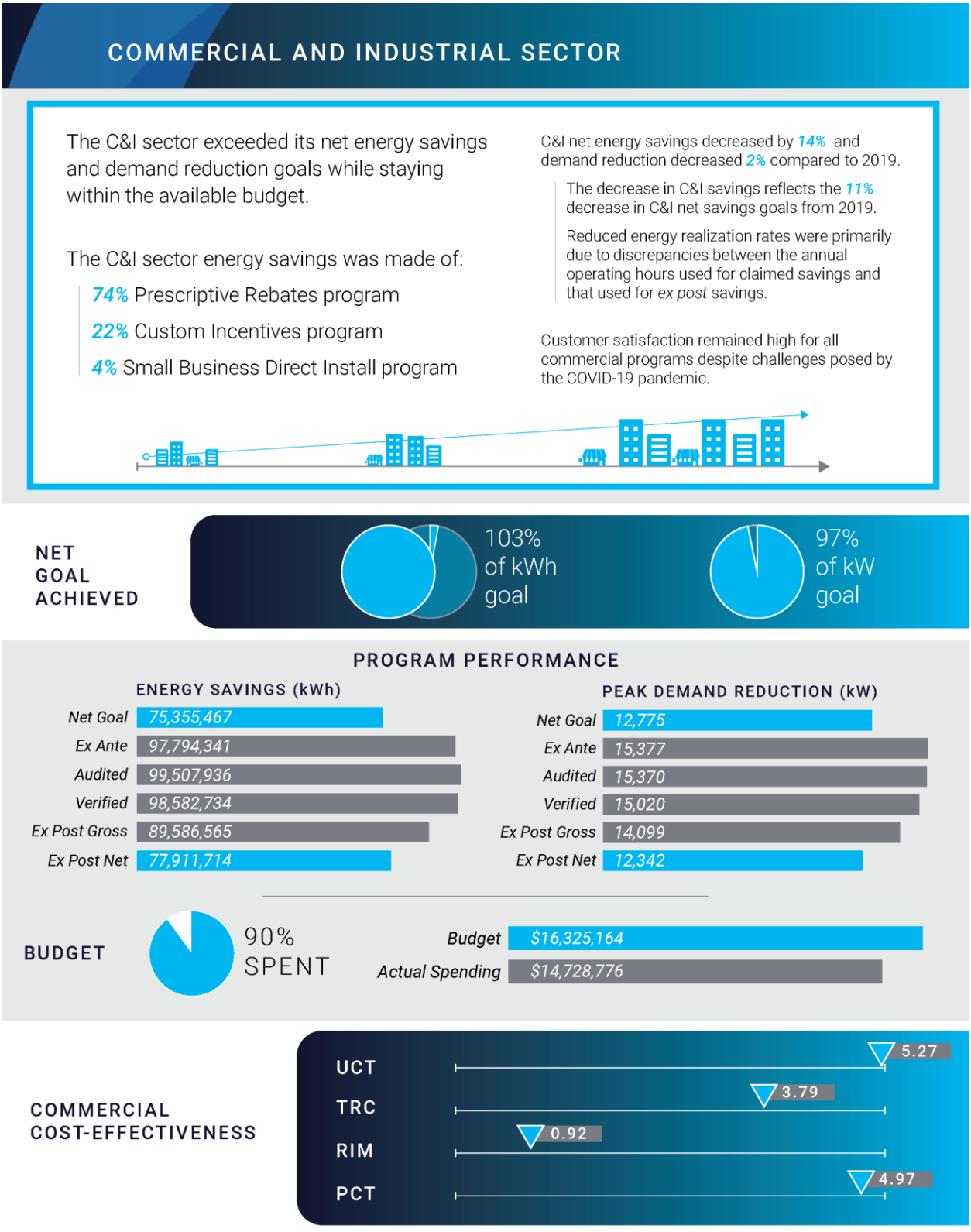


Figure 3. 2020 Commercial and Industrial Sector Results



Portfolio Results

The residential sector achieved 57,156,970 kWh in net energy savings and 41,322 kW in net demand reduction, or 110% and 80% of its respective goals. The C&I sector achieved 77,911,714 kWh in net energy savings and 12,775 kW in net demand reduction, representing 103% and 97% of its respective goals. Total portfolio savings amounted to 135,068,684 kWh in net energy savings and 53,664 kW in net demand reduction, representing 106% and 83% of goals, respectively. Table 1 shows program-level, sector-level, and portfolio-level goal achievements.

Table 1. 2020 Portfolio Goal Achievement

Program	Energy Savings (kWh)			Demand Reduction (kW)		
	Net Goal	*Ex Post* Net	Net Goal Achieved	Net Goal	*Ex Post* Net	Net Goal Achieved
Residential						
Demand Response	503,030	605,027	120%	40,449	30,761	76%
Appliance Recycling	3,400,864	1,570,361	46%	561	247	44%
Community Based Lighting	1,437,048	2,718,028	189%	168	372	221%
Income Qualified Weatherization	3,916,055	1,836,700	47%	530	222	42%
Lighting and Appliance	3,116,688	7,723,798	248%	897	994	111%
Multifamily Direct Install	3,192,148	3,640,055	114%	380	200	53%
Peer Comparison	27,000,000	31,582,567	117%	7,006	6,927	99%
School Kits	3,163,346	4,203,478	133%	543	373	69%
Whole Home	6,394,857	3,276,956	51%	1,362	1,226	90%
Total Residential	**52,124,036**	**57,156,970**	**110%**	**51,896**	**41,322**	**80%**
Commercial and Industrial						
Demand Response	0	0	N/A	778	232	30%
Custom Incentives	18,614,706	17,086,638	92%	2,852	1,705	60%
Prescriptive Rebates	53,078,008	57,702,380	109%	8,601	9,877	115%
Small Business Direct Install	3,662,753	3,122,696	85%	544	528	97%
Total Commercial and Industrial	**75,355,467**	**77,911,714**	**103%**	**12,775**	**12,342**	**97%**
Total 2020 Portfolio	**127,479,503**	**135,068,684**	**106%**	**64,671**	**53,664**	**83%**

Factors Affecting Performance

IPL exceeded its 2020 net energy-savings goal for the portfolio due to a variety of factors in both the C&I and residential sectors. IPL's 2020 net energy savings goal was 18% lower than 2019 and its savings declined by 23% from 2019 achievements (representing 39,567,434 kWh).

The Custom Incentives and Prescriptive Rebates programs continued to deliver a majority of C&I sector savings, together providing 96%. The Custom component of the Custom Incentives program generated 84% of the program's savings, up from 55% in 2019. The increase in the proportion of Custom component savings in 2020 stemmed from an increase in net-to-gross (NTG) ratio (82% in 2020 and 69% in 2019), reflecting that the program was more influential in customers' decisions to complete energy-efficiency projects than in past years. The Retro-Commissioning component also played a smaller role in

terms of savings in 2020, with just 18 participating measures in 2020 compared to 60. IPL also did not offer the Strategic Energy Management component in 2020.

While the Prescriptive Rebates program continued to exceed its net energy-savings goal in 2020, these net goals declined by 27%. Consistent with its lower 2020 net savings goal, 482 fewer units were rebated in the 2020 Prescriptive Rebates program than in 2019. The Non-Midstream delivery channel's net savings declined by 26% compared to 2019 levels, yet the Midstream delivery channel's savings increased by 17%. The program components saw similar NTG ratios as in prior years. The performance of the Small Business Direct Install (SBDI) program improved slightly (with 2020 savings almost identical to 2019 levels).

In the residential sector, IPL adapted program delivery to the new pandemic operating conditions, which limited in-person activities that are the core savings opportunities for some programs. As a result, savings achievements were more limited in 2020. All residential programs except Demand Response and School Kits decreased savings from 2019 levels. The continued expansion of smart thermostats in the Demand Response program tripled energy savings from 2019 levels, and School Kits remained a steady contributor to the residential sector with the addition of new kit measures.

Energy Savings and Demand Reduction Summary

Table 2 shows the energy savings associated with each step of the impact evaluation process, from *ex ante* reported savings to *ex post* net savings, along with the realization rates and NTG results for each program; Table 3 shows these same results for the demand reduction. Variances in realization rates were largely the result the evaluation team's use of more current or participant-specific data to inform *ex post* calculations. Low NTGs, however, for ARP and Lighting and Appliance, while not outside the industry norm, drove *ex post* net savings down.

In the C&I sector, the Custom Incentives program realization rates were close to 100%. While the Prescriptive Rebates NTG was similar to 2019 results, the Custom and Retro-Commissioning components' NTGs increased from 69% and 68% in 2019 to 82% and 98% in 2020, respectively, and the SBDI NTG increased from 88% in 2019 to 97% in 2020.

Table 2. 2020 Portfolio Energy Savings Summary

Program	Energy Savings (kWh)						
	Ex Ante	Audited	Verified	Realization Rate	*Ex Post* Gross	NTG [a]	*Ex Post* Net
Residential							
Demand Response	1,321,712	2,113,237	390,771	46%	605,027	100%	605,027
Appliance Recycling	2,467,044	2,467,044	2,391,644	120%	2,960,755	53%	1,570,361
Community Based Lighting	1,437,118	1,437,118	1,359,014	189%	2,718,028	100%	2,718,028
Income Qualified Weatherization	2,798,751	2,803,722	1,281,907	66%	1,836,700	100%	1,836,700
Lighting and Appliance	6,134,065	6,011,944	5,045,655	251%	15,414,378	50%	7,723,798
Multifamily Direct Install	3,600,559	3,553,633	3,008,409	104%	3,741,181	97%	3,640,055
Peer Comparison	32,602,622	32,602,622	32,602,622	97%	31,626,229	100%	31,582,567
School Kits	4,369,653	4,369,653	4,610,402	105%	4,604,685	91%	4,203,478
Whole Home	6,581,271	6,578,940	3,499,452	63%	4,141,387	79%	3,276,956
Total Residential	**61,312,795**	**61,937,913**	**54,189,876**	**110%**	**67,648,370**	**N/A**	**57,156,970**
Commercial and Industrial							
Demand Response	419	0	0	0%	0	N/A	0
Custom Incentives	20,798,732	20,528,622	20,528,622	98%	20,289,530	Custom: 82% RCx: 98%	17,086,638
Prescriptive Rebates	73,270,872	75,254,996	74,401,915	90%	66,090,350	NM: 84% M: 95% C: 85%	57,702,380
Small Business Direct Install	3,724,318	3,724,318	3,652,197	86%	3,206,685	97%	3,122,696
Total C&I	**97,794,341**	**99,507,936**	**98,582,734**	**92%**	**89,586,565**	**N/A**	**77,911,714**
Total 2020 Portfolio	**159,107,136**	**161,445,849**	**152,772,610**	**99%**	**157,234,935**	**N/A**	**135,068,684**

Note: Totals may not sum due to rounding.

[a] RCx = Retro-Commissioning component; NM = Non-Midstream delivery channel; M = Midstream delivery channel; C = carryover savings.

Table 3. 2020 Portfolio Demand Reduction Summary

Program	Peak Demand Reduction (kW)						
	Ex Ante	Audited	Verified	Realization Rate	*Ex Post* Gross	NTG [a]	*Ex Post* Net
Residential							
Demand Response	39,665	40,422	30,904	78%	30,761	100%	30,761
Appliance Recycling	404	404	398	112%	452	55%	247
Community Based Lighting	197	197	186	189%	372	100%	372
Income Qualified Weatherization	447	431	168	50%	222	100%	222
Lighting and Appliance	1,237	1,723	1,486	167%	2,060	48%	994
Multifamily Direct Install	216	241	122	97%	209	96%	200
Peer Comparison	7,951	7,951	7,951	88%	6,959	100%	6,927
School Kits	749	749	746	56%	417	89%	373
Whole Home	2,147	2,119	1,502	80%	1,711	72%	1,226
Total Residential	**53,013**	**54,237**	**43,463**	**81%**	**43,163**	**N/A**	**41,322**
Commercial & Industrial							
Demand Response	774	748	556	30%	232	N/A	232
Custom Incentives	2,327	2,395	2,395	89%	2,077	Custom: 82% RCx: 98%	1,705
Prescriptive Rebates	11,702	11,654	11,507	96%	11,248	NM: 84% M: 95% C: 85%	9,877
Small Business Direct Install	574	573	562	94%	542	97%	528
Total C&I	**15,377**	**15,370**	**15,020**	92%	**14,099**	**N/A**	**12,342**
Total 2020 Portfolio	**68,390**	**69,607**	**58,484**	**84%**	**57,262**	**N/A**	**53,664**

Note: Totals may not sum due to rounding.

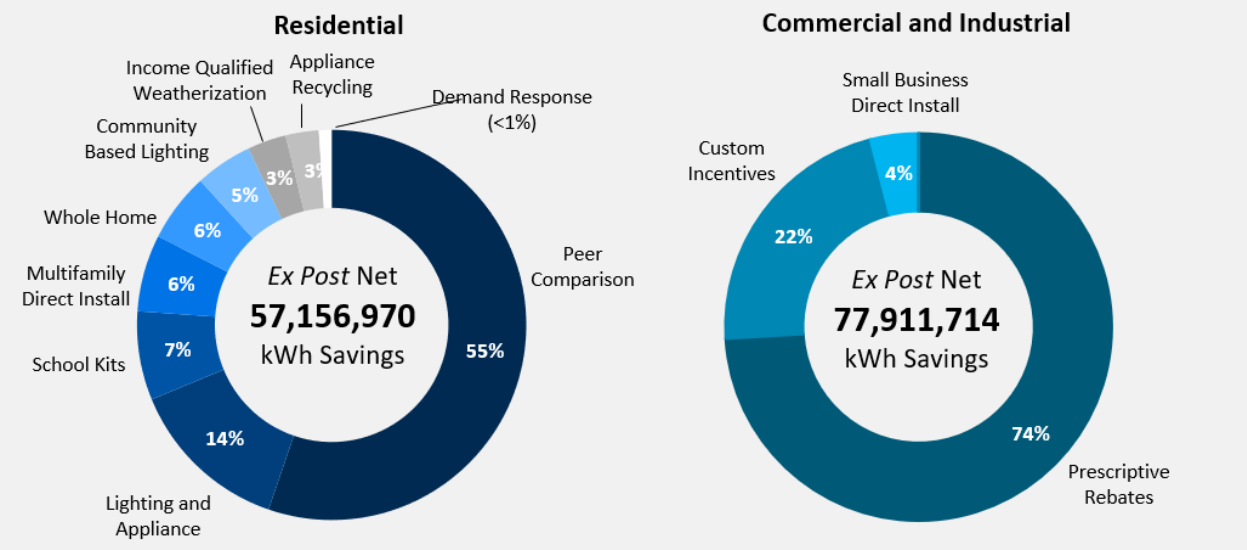
[a] RCx = Retro-Commissioning component; NM = Non-Midstream delivery channel; M = Midstream delivery channel; C = carryover savings

Program Contribution to Portfolio Savings

Peer Comparison, with 55% of total savings, continued to contribute the most to residential sector energy savings (compared to 39% of the 2019 residential sector savings). The Lighting and Appliance program contributed 14% of overall residential savings (compared to 25% in 2019) and the School Kits program contributed 7% of overall residential savings. All other residential programs contributed 6% or less to sector savings.

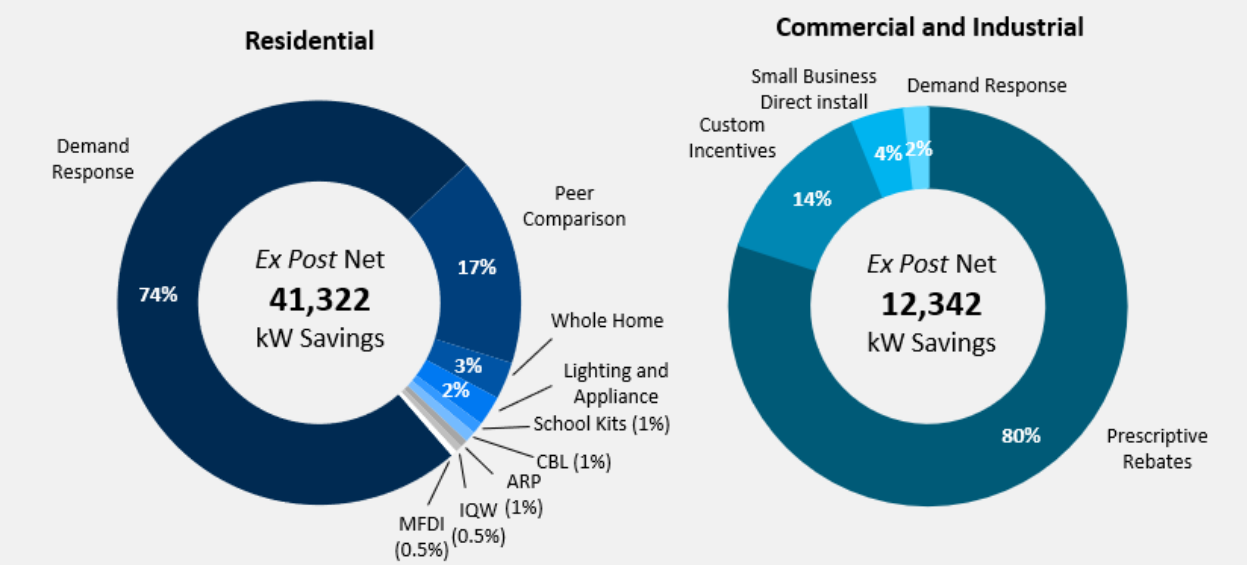
The Prescriptive Rebates program increased its contribution to total C&I sector savings, at 74% in 2020 compared to 69% in 2019. The Custom Incentives program contributed 22% of total C&I sector savings in 2020 (compared to 27% in 2019) and the SBDI program contributed 4% in 2020 (compared to 3% in 2019; Figure 4).

Figure 4. Program Contributions to 2020 Portfolio *Ex Post* Net Energy Savings



The Demand Response program contributed the most to residential demand reduction, with 74% of the total (representing a small increase from 72% in 2019). The Peer Comparison program contributed 17% of total residential demand reduction, and all other residential programs each represented 3% or less of total residential demand reduction. In the C&I sector, Prescriptive Rebates accounted for 80% of total demand reduction, while Custom Incentives accounted for 14%, SBDI accounted for 4%, and Demand Response accounted for 2%, as shown in Figure 5.

Figure 5. Program Contributions to 2020 Portfolio *Ex Post* Net Demand Reduction



Program Spending and Cost-Effectiveness

As shown in Table 4, IPL budgeted $34,259,363 for its 2020 DSM portfolio and spent 83% of that budget.

Table 4. 2020 Portfolio Budget and Spending

Program	2020 Budget	2020 Actual Spending	Percentage Spent
Residential			
Demand Response	$3,686,274	$3,053,524	83%
Appliance Recycling	$899,613	$660,835	73%
Community Based Lighting	$490,687	$415,670	85%
Income Qualified Weatherization	$2,770,789	$1,764,452	64%
Lighting and Appliance	$2,551,607	$1,536,914	60%
Multifamily Direct Install	$1,591,313	$1,494,127	94%
Peer Comparison	$1,428,719	$824,244	58%
School Kits	$618,597	$573,370	93%
Whole Home	$3,896,600	$3,551,384	91%
Total Residential	**$17,934,199**	**$13,874,521**	**77%**
Commercial and Industrial			
Demand Response	$133,795	$99,759	75%
Custom Incentives	$4,798,009	$3,645,838	76%
Prescriptive Rebates	$10,197,060	$10,045,203	99%
Small Business Direct Install	$1,196,301	$937,976	78%
Total Commercial and Industrial	**$16,325,164**	**$14,728,776**	**90%**
Total 2020 Portfolio	**$34,259,363**	**$28,603,297**	**83%**

Table 5 shows the cost-effectiveness analysis results, measured by comparing an investment's monetized energy efficiency benefits with its costs. Typically, five cost-effectiveness tests may be employed in energy efficiency program evaluations:

- The utility cost test (UCT), sometimes called the program administrator cost test
- The total resource cost test (TRC)
- The ratepayer impact measure test (RIM)
- The participant cost test (PCT)
- The societal cost test (SCT)

For this evaluation, measurement, and verification (EM&V) analysis, the team did not employ the SCT, as estimates of environmental and other non-energy costs and benefits were not part of the evaluation. The *Cost-Effectiveness* chapter provides inputs used and a description of each test.

Note that based on an agreement with the Office of Utility Consumer Counselor in 2019, IPL agreed to remove benefits associated with the general service lighting from the cost-effectiveness analysis for the Community Based Lighting and Lighting and Appliance programs. Those adjustments are incorporated into the results presented below, and the Cost-Effectiveness chapter presents two sets of results that include and exclude the general service lighting.

Table 5. 2020 Portfolio Cost-Effectiveness Results

Program	Cost-Effectiveness Test			
	UCT	TRC	RIM	PCT
Residential				
Demand Response	1.56	2.29	1.28	N/A
Appliance Recycling	1.3	1.79	0.5	N/A
Community Based Lighting [a]	-	-	-	N/A
Income Qualified Weatherization	0.84	0.84	0.43	N/A
Lighting and Appliance [a]	3.63	2.96	0.75	9.69
Multifamily Direct Install	1.88	1.88	0.55	N/A
Peer Comparison	2.88	2.88	0.63	N/A
School Kits	5.26	5.26	0.71	N/A
Whole Home	1.13	1.16	0.62	7.07
Total Residential	**1.71**	**1.82**	**0.67**	**16.99**
Commercial and Industrial				
Demand Response	0.29	0.36	0.29	N/A
Custom Incentives	3.99	2.52	0.8	4.58
Prescriptive Rebates	6.09	4.45	0.97	4.89
Small Business Direct Install	3.12	3.12	0.84	N/A
Total Commercial and Industrial	**5.27**	**3.79**	**0.92**	**4.97**
Total 2020 Portfolio	**3.51**	**3.01**	**0.85**	**6.15**

[a] Excludes general service lighting

Key Findings and Recommendations

Based on 2020 evaluation findings, the evaluation team developed multiple recommendations for making program enhancements, updating data tracking processes, and improving the programs' uptake. This section summarizes key thematic observations across the portfolio.

Portfolio Savings

- **IPL's program performance cannot be explained without acknowledging the impact of the unprecedented worldwide COVID-19 pandemic.** IQW and Whole Home achieved lower than expected savings due to the prevention of in-person activities from March through December. The Whole Home program achieved 51% of the energy-savings goal and 90% of the demand reduction goal and IQW achieved 47% of the energy-savings goal and 42% of the demand reduction goal. This decreased savings is mostly the result of the COVID-19 pandemic, which prevented CLEAResult from administering in-person program components that typically provide the majority of overall savings. The program reliance on energy-saving kits led to more evaluation adjustments due to inconsistent and incomplete data collection.
- **The Demand Response program's demand reduction achievements were likely suppressed by the COVID-19 pandemic and by the automatic unenrollment of customers who did not sign new terms of agreement for their Nest device.** Across all six demand response events in 2020, between 18% and 26% of Nest participants opted out, compared to between 11% and 14% in 2019. The increased number of customers staying at home during the workday during the

pandemic likely led to the increased opt-out rate despite IPL's educational email to enrolled customer prior to the start of the event season. Additionally, in 2020, Google required all customers who own a Nest device to sign a new terms of agreement, and all customers who did not sign the agreement were automatically unenrolled from the Demand Response program.

- **IPL expanded its measure offerings and diversified savings opportunities.** Increasing the promotion of IPL Marketplace rebates for electric heat pump hot water heaters, air purifiers, and dehumidifiers and providing appliance rebate promotions on new measure offerings can further buffer against the anticipated decline in lighting sales. IPL is planning additional ways to diversify savings opportunities in the next program cycle through a virtual Retro-Commissioning offering, a midstream HVAC channel, and new technologies such as electric vehicle chargers to participant in the Demand Response program.

Program Adaptations to the Pandemic

- **Although the pandemic affected program in-person services and equipment availability, and altered patterns of energy use in both residential and commercial settings, adaptations to offer alternative services such as virtual audits buffered the potential loss of savings opportunities for programs like IQW and Whole Home. Strong project pipelines cultivated in 2019 ensured continued participation and interest in programs such as MFDI, SBDI, Prescriptive, and Custom.**
  - Customers were *very satisfied* with the new virtual assessment offering that was piloted for IQW and Whole Home during 2020 in response to the COVID-19 pandemic. In-home and virtual participants were nearly equally satisfied with the time it took to complete their energy assessment and with the assessment overall. Virtual assessment participants were more satisfied than in-home participants with the professionalism of their technician, the amount of time between scheduling and the assessment, and the assessment report.
  - IPL met its MFDI program energy-savings goals by June 2020, in large part due to the healthy pipeline of multifamily projects developed by CLEAResult during 2019.

Targeted Marketing and Promotion

- **Ongoing marketing and promotions, updates to the IPL Marketplace website platform, and 2020 efforts to lower the final IPL Marketplace purchase prices paid off in increased sales of LEDs, thermostats, and smart strips.**
- **Promotional incentives and an emphasis on email marketing buffeted the ARP against the challenging circumstances of the pandemic.** A $75 incentive led to a record-high number of monthly recycled units and the ARP continued to experience high customer satisfaction.
- **The CBL program continued to deliver a needed service, demonstrated by high satisfaction and high installation rates. Bulb packaging remains an important method for helping those customers to access other IPL programs, but aligning the educational content with the target audience can help increase installation rates.** The CBL program bulb packaging cross-promotes the eScore Home Energy Assessment program and mentions "Ways to Save" through other energy efficiency programs and rebates offered by IPL. Survey respondents reported similar

levels of awareness of the eScore Home Energy Assessment, Home Energy Reports (Peer Comparison Program), and Appliance Recycling (ARP) programs. Survey responses indicate that the CBL program bulb packaging is an effective strategy for marketing IPL's other programs and is the primary mechanism for educating program participants; however, the existing content does not emphasize the information that would encourage participants to immediately install the bulbs.

Data Tracking and Measurement and Verification Strategies

- **The Whole Home, MFDI, and IQW programs' energy-savings realization rates decreased in 2020 from 2019. The reliance on energy-saving kits, which typically have more adjustments due to inconsistent or incomplete data collection, drove these differences.** These adjustments are consistent with the approach we used in both the 2018 and 2019 evaluations. For energy-saving kit recipients, the evaluation team recommends tracking water heater and HVAC system fuel types.
- **The 2020 Retro-Commissioning component eligibility guidance indicates that buildings with programmable thermostats are not eligible, but these buildings were still allowed into the program.** IPL may consider shifting customers with programmable thermostats into a virtual retro-commissioning offering in future program years.
- **Heapy is increasingly using the small business retro-commissioning calculator for measure documentation: this tool may require additional vetting, especially as the program continues to grow and the virtual component is added.** Heapy has developed a suite of M&V tools to document measure savings, one of which was designed for small-packaged HVAC systems and primarily allows entries related to the occupied and unoccupied temperature setpoints and the scheduling of the HVAC unit. Within the measures that used this tool, several instances overestimated the natural gas savings. Since IPL is not a natural gas utility, this error is inconsequential to the evaluation scope. However, this error might indicate that the small business retro-commissioning calculator in particular needs additional quality control verification to produce accurate savings, particularly if Heapy will continue using this tool for Retro-Commissioning projects in subsequent years.

Trade Ally Engagement and Customer Engagement

- **Trade allies continued to be an important source of program awareness for commercial programs. Enhancements to the educational resources and application processes can further improve satisfaction and engagement.**
- **Customer satisfaction with the Prescriptive Rebates program remains high.** However, the rebate application process remains a source of frustration for customers, and some non-lighting contractors view the rebate application as a barrier to their sales process. Shifting HVAC rebates to a midstream program concept will likely alleviate these customer and contractor concerns about the rebate application process and will diversify savings opportunities for future program years. Also, while lighting contractors remain an important source of program awareness for

both customers and non-lighting contractors, additional marketing materials would help them to further increase program awareness.

- **The Custom Incentives program operated smoothly in 2020, with contractors resuming their large role in program awareness and project initiation.** Despite the COVID-19 pandemic, the program operated smoothly in 2020, with a steady number of Custom component projects in 2019 and 2020. CLEAResult resumed its pre-2019 strategy of primarily marketing the program through contractors and held a trade ally seminar in February 2020. Though still lower than 2018 and 2017 levels (which were 54% and 56%, respectively), contractors and vendors were a source of program awareness for 42% of respondents in 2020, increasing from 18% of respondents in 2019. The number of contractors participating in the Custom component also increased by 4% in 2020 compared to 2019 levels.
- **Though customer engagement with the Peer Comparison program email reports remained strong in 2020, differences in customer demographics or home type between waves may be driving the lower savings potential and higher attrition for newer waves (as compared to older waves).** Oracle reported an email open rate of 45% across all waves in 2020 for the monthly home energy reports (compared to 43% in 2019 and 40% in 2018). However, even though a higher proportion of customers in newer waves receive email reports and have higher email open rates than customers in older waves, the customers in these newer waves also saved less energy per home than those in older waves in 2020. Oracle placed customers with the highest potential for savings in the earlier waves, which means that newer waves overall consist of homes that have lower energy-savings potential due to factors such a smaller home size or a more transient customer base.

Customer Satisfaction

- **Participant customers continued to provide high satisfaction ratings.** This positive feedback demonstrates the efficient processes and quality customer service IPL has refined over the last few years, as well as the adaptions it made to continue to serve customers during the challenging pandemic. Continued micro-changes to program operations will improve the value these programs provide to customers.
  - **Customer satisfaction with the IPL Marketplace remains high, but opportunity exists to make incremental improvements.** Customers of all purchase types provided high satisfaction ratings with the 2020 IPL Marketplace and with the improvements to speed up product delivery. Customers suggested improving the ease and speed of the return process and increasing thermostat product quality, which was bolstered by suggestions to provide additional support to install thermostats.
  - **Customer satisfaction remained high for the Custom Incentives program in 2020:** all Custom component survey respondents were *very satisfied* or *somewhat satisfied* with the program overall, and most respondents were satisfied with the various program aspects.
  - **All Retro-Commissioning participants reported receiving measurable energy and cost savings from participation in the Retro-Commissioning component and several expressed a desire for additional feedback on continual improvement.** Participation satisfaction

remains very high, with all participants expressing that they were pleased with the energy and cost savings they achieved. A couple participants expressed interest in continuing to improve upon their positive results but were unsure of the next steps. Retro-Commissioning participants are primed to participate in other IPL offerings given their positive experience with the program component.

Evaluation Objectives and Methodology

The team followed evaluation guidelines presented in the IPL Evaluation Framework, approved by the IPL Oversight Board in June 2015. While these methods were consistent with prior evaluation years, the evaluation team also employed updated methods where practical (and where industry standards have changed) for the process, impact, and cost-effectiveness analyses of each program in IPL's DSM portfolio.

IMPACT EVALUATIONS

The team reviewed deemed savings values and assumptions, verified measure installations, determined freeridership and spillover, and calculated *ex post* gross and net electric impacts for each program.

PROCESS EVALUATIONS

The team investigated customers' program experiences, market barriers, and program processes through web and phone surveys with program participants, interviews with program and implementation staff, and secondary research as needed to compare program results to similar programs around the country. Ultimately, the team determined aspects of each program that worked well and areas that may require improvements.

COST-EFFECTIVENESS ASSESSMENT

The team conducted a cost-effectiveness analysis to compare the relative costs and benefits from IPL's investment in each program. In the energy efficiency industry, cost-effectiveness indicates the energy supply's relative performance (or the economic attractiveness of any energy efficiency investment or practice) compared to the costs of energy produced and delivered in the absence of such investments (but without considering the value or costs of non-energy benefits of non-included externalities). Typical cost-effectiveness formulas provide economic comparisons of costs and benefits. The team applied four cost-effectiveness tests to IPL's individual programs: the PCT, UCT, RIM, and TRC.

Research Objectives

The evaluation team used defined research objectives to focus our research for each program. Across IPL's portfolio, the team examined a common set of research areas to inform the evaluation, in addition to the customized program-level research questions described in each program chapter.

MOST IMPACT EVALUATIONS INCLUDED FIVE RESEARCH AREAS:

1. Reviewing data quality
2. Determining in-service rates (ISRs)
3. Estimating freeridership and spillover
4. Calculating energy savings and demand reduction
5. Determining program cost-effectiveness

MOST PROCESS EVALUATIONS INCLUDED FIVE RESEARCH AREAS:

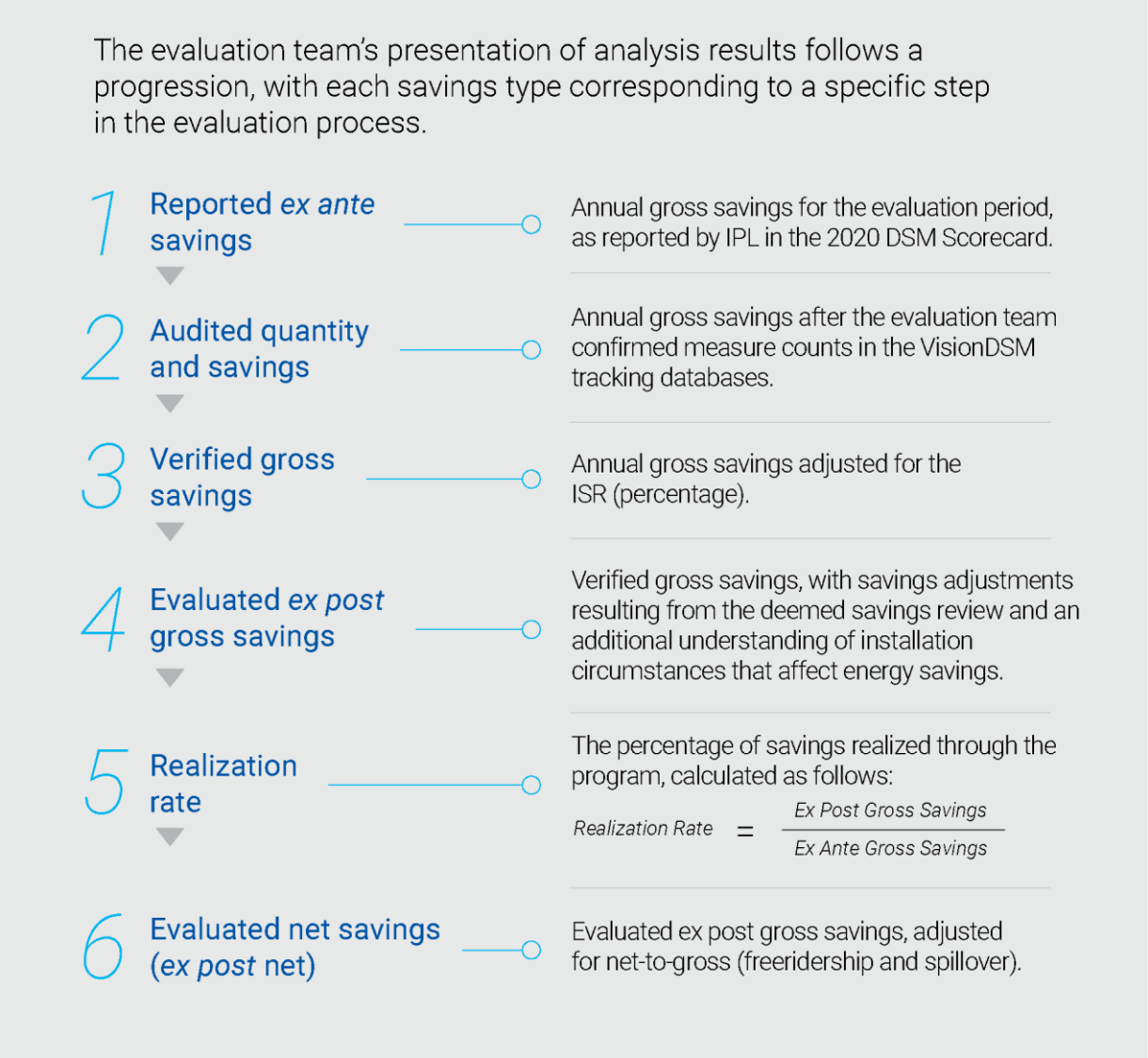
1. Following up on 2019 evaluation recommendations
2. Assessing program design, delivery, and administration in consideration of planned program reconfigurations for 2021
3. Assessing program processes
4. Evaluating customers' motivations and barriers to participation
5. Assessing program challenges and opportunities for improvement

Impact Evaluation Approach

The team employed statistical- and engineering-based analysis techniques to adjust program-reported gross savings (*ex ante*) using information gathered through database and document reviews, engineering reviews of tracking data and project workpapers, the *Indiana Technical Reference Manual* version 2.2 (Indiana TRM (v2.2))[1] deemed savings calculation reviews, on-site verification and metering, and regression analysis. Figure 6 shows the team's analysis steps.

[1] July 2015. *Indiana Technical Reference Manual Version 2.2.*

Figure 6. 2020 Impact Evaluation Steps



Appendix A further defines each evaluation step, detailing its purpose.

Process Evaluation Approach

The evaluation team conducted several process evaluation activities to assess program operations and to identify successes, challenges, and opportunities for individual programs.

Interviewed program and implementation staff to document how each program worked, understand program operations, and gain insights into factors influencing program performance.

Surveyed participants to understand their perspectives and experiences with a given program.

Followed up on recommendations made as a result of the 2019 evaluation.

Research Activities

The evaluation team designed the 2020 research activities to emphasize primary data collection for the C&I programs and for programs that had more variation in measures or savings results in prior years. We conducted a more limited process evaluation for the remaining residential programs. Table 6 shows research activities the team conducted for each program, followed by descriptions of each activity.

Table 6. 2020 Demand-Side Management Portfolio Evaluation Activities

Program	Data and Materials Review	Engineering Analysis	Regression Modeling	Billing Analysis	Virtual Measurement and Verification	Program Manager Interviews	Participant Surveys	Cost-Effectiveness
Demand Response	X	X	X	-	-	X	-	X
Appliance Recycling	X	X	X	-	-	X	X	X
Community Based Lighting	X	X	-	-	-	X	X	X
Income Qualified Weatherization	X	X	-	-	-	X	X	X
Lighting and Appliance	X	X	-	-	-	X	X	X
Multifamily Direct Install	X	X	-	-	-	X	-	X
Peer Comparison	X	X	-	X	-	X	-	X
School Kits	X	X	-	-	-	X	-	X
Whole Home	X	X	-	-	-	X	X	X
Custom Incentives	X	X	-	X	X	X	X	X
Prescriptive Rebates	X	X	-	-	X	X	X	X
Small Business Direct Install	X	X	-	-	X	X	X	X

Data and Materials Review

The evaluation team reviewed IPL's program tracking databases, scorecards, and other documentation to assess the information's quality and to identify potential anomalous entries, outliers, duplicates, or missing values. This included reviewing all data fields recommended in the Indiana TRM (v2.2), along with other necessary variables used to calculate measure savings.

The team conducted a data and document review for all programs at the start of the evaluation, which included several specific activities:

- Verified that all customer and vendor information required to conduct primary research was available and complete
- Confirmed that all measure-specific data included the necessary details (in the proper formats) to enable an impact evaluation
- Confirmed that the tracking information required to calculate impacts were available and determined the level of completeness
- Worked with IPL and the program implementers to obtain additional customer information, measure-specific details, and other tracking information where needed

For measures not included in the Indiana TRM (v2.2), the evaluation team reviewed project documentation (such as audit reports and savings calculation workpapers) from a sample of energy efficiency project sites. The team closely reviewed the calculation procedures and savings estimate documentation, and verified the appropriateness of the implementers' analyses for calculating savings as well as the assumptions the implementers' used for participating facilities' structural attributes and operational characteristics.

Engineering Analysis

The evaluation team compared the program tracking data in VisionDSM with the Indiana TRM (v2.2) savings algorithms to verify the inputs and correct use of algorithms. As the first step in this review, the team identified all assumed inputs for each algorithm (such as average AOH for residential lighting) and installation-specific values (such as R-values, the change in cubic feet per minute [CFM] or wattage, or the thickness of tank wrap). The team then confirmed that program tracking data contained all installation-specific inputs required to successfully calculate savings for each measure.

The team also identified missing but required inputs and worked with IPL to determine whether these inputs existed or if the implementer made other assumptions regarding these inputs. After confirming the data inputs, the team replicated measure-level savings and determined a realization rate.

The evaluation team used engineering analysis to calculate non-event peak coincident demand reduction for Demand Response program smart thermostats.

Regression Modeling

For the Demand Response program, the evaluation team used regression analyses of demand response data to determine event-based program demand reduction. Data sources for the Demand Response program included device logger data for two-way Landis+Gyr (L+G) switches and fan runtime data for Nest smart thermostats. The team could not collect customer-level data for the one-way Cannon switches, and instead modeled aggregated demand response impacts from previous years.

The team estimated the referential load during event days through linear random-effects regression models that used available device data (for 2020 Nest, Ecobee, Honeywell, and L+G thermostats) and weather data from the National Oceanic and Atmospheric Administration's National Climactic Data Center. The team then used regression model results to establish demand reduction as the difference between observed (or actual) demand on the event day and demand predicted in the event's absence. To estimate event day demand response impacts from Cannon switches, the team regressed demand response savings from 2020 on temperatures during event hours, and predicted 2020 demand response savings using observed weather. More detail is available in *Appendix C*.

For the ARP, the evaluation team estimated per-unit savings for recycled refrigerators and freezers using meter data and multivariate regression models. The team used the *Uniform Methods Project* (UMP)[2] model specification for the annual energy consumption of refrigerators and freezers recycled in 2020. We then analyzed the corresponding characteristics for participating appliances and calculated averages or proportions for each independent variable. More detail is found in *Appendix E*.

Billing Analysis

The evaluation team used billing analysis to determine evaluated program savings for the Peer Comparison program and Retro-Commissioning component projects.

For the Peer Comparison program, the evaluation team used a panel regression analysis of monthly customer bills, then estimated program electricity savings by comparing the electricity consumption of control homes to that of homes receiving peer comparison reports. The panel regression allowed the team to control for temperature differences and other non-program impacts between homes. The team also quantified the program's impact on participation in other IPL residential energy efficiency programs. As a final step, the evaluation team analyzed program participation and measure savings data to determine efficiency program participation uplift as well as program savings counted in other efficiency programs. To determine net evaluated savings, the team subtracted the uplift savings value from the *ex post* gross savings.

For the Retro-Commissioning component, the evaluation team used utility bill analysis of several 2020 projects (as measure-level analysis was not available for these projects). The team employed a regression-based utility bill analysis, using actual daily weather data from the National Oceanic and Atmospheric Administration[3] and hourly typical meteorological year (TMY3) weather data from the National Renewable Energy Laboratory[4] specific to each project site location. This required monthly utility data from the project, both pre- and post-implementation. Ideally, the baseline period consists of

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2 National Renewable Energy Laboratory. October 2017. *Uniform Methods Project: Methods for Determining Energy Efficiency Savings for Specific Measures*. https://www.nrel.gov/docs/fy17osti/68562.pdf

3 National Oceanic and Atmospheric Administration. "Data Tools: Local Climatological Data." https://www.ncdc.noaa.gov/cdo-web/datatools/lcd

4 National Renewable Energy Laboratory. "National Solar Radiation Data Base." 1991-2005 Update: Typical Meteorological Year 3. https://rredc.nrel.gov/solar/old_data/nsrdb/1991-2005/tmy3/

12 months of utility data and the post-implementation period consists of at least three months of utility data, preferably spanning both the heating and cooling seasons.

Virtual Measurement and Verification

For commercial programs, the evaluation team typically conducts on-site activities to verify and meter program measures installed in C&I buildings. For the 2020 evaluation, the COVID-19 pandemic limited the team's ability to visit sites in-person, and instead we conducted all "on-site" activities through a virtual platform. The team requested trend data from customers and used that to determine load profiles associated with lighting, HVAC controls, chiller upgrades, and compressed air projects whenever possible.

During virtual site visits, the team gathered data for the impact analyses. This involved developing a stratified random sample for on-site EM&V, targeting ±10% precision at 90% confidence for each C&I program across the three-year evaluation cycle. Since 2017, the team has used stratification to account for the different delivery channels in the Prescriptive Rebates program (Midstream and Non-Midstream), targeting ±10% precision at 90% confidence for each channel.

The virtual site visits, along with the engineering desk reviews, helped the evaluation team meet the 90% confidence and ±10% precision quality targets during the 2020 evaluation year. IPL provided contact information for project decision makers and implementation contractors, and the team contacted customers at selected sites to schedule visits in advance. During these virtual EM&V site visits, the evaluation team conducted three primary tasks:

- Verified that all measures were installed correctly and functioning properly and confirmed the operational characteristics of installed equipment (such as temperature, setpoints, and annual operating hours [AOH])
- Collected physical data (such as cooling capacity or horsepower) and analyzed energy savings from the installed improvements and measures
- Interviewed facility personnel to obtain additional information about installed systems to supplement data from other sources

Individual program chapters provide program-specific sample sizes and details of our activities conducted during the EM&V site visits.

A set of sites for each C&I program involved selecting samples using a systematic approach to probability proportional to size (PPS) sampling; in this case, the team based the size on *ex ante* energy savings. The evaluation team evaluated enough measures in the samples to calculate ISRs and *ex post* realization rates for each program.

Weighting by the population resulted in project measures with higher savings having a higher probability of being selected into the evaluation sample. PPS sampling also aids in realization rate precision, because *ex post* gross energy savings are correlated with reported savings and the approach increases the proportion of savings in the sample. Table 7 shows the site visit sample for the C&I programs.

Table 7. 2020 Commercial and Industrial Sector Site Visit Sample

Program	Population (Measures)	Target Completes	Achieved Completes
Custom Incentives - Custom	78	59	54
Custom Incentives - Retro-Commissioning	17	17	17
Prescriptive Rebates	388,598	27	18
Small Business Direct Install	1,053	19	16

Program Manager Interviews

The evaluation team interviewed IPL program managers and implementation staff to understand how each program was designed and delivered, what elements worked well, and what could be improved. The interviews covered a wide range of topics, such as program design and administration, communication and data tracking processes, marketing strategies, trade ally and participant interactions, and challenges and successes.

Participant Surveys

To support the impact and process evaluations, the team surveyed program participants to collect data about their awareness of IPL's energy-saving programs, product installation rates, behavior and equipment use, satisfaction with program components, purchase considerations, participation barriers, and (where applicable) measure-level or program-level freeridership and spillover. These surveys informed both process and impact research questions.

The team designed the evaluation to achieve high levels of rigor such that primary data collection activities would support ±10% relative precision with 90% confidence by program, across the three-year cycle (although many measures and metrics were planned to achieve this precision and confidence annually). This approach involved concentrating the cost-effective evaluation on program aspects or measures that required more rigor.

The team used a sampling approach to develop sample frames for participant surveys and to determine the number of site visits needed for field work. In each case, the team designed the survey samples to achieve ±10% precision with 90% confidence for the ISR, NTG value, or both (based on program) across the three-year period, accounting for the total number of respondents. Based on small population sizes, the team attempted to complete analysis of a census of some programs or measures. We achieved the desired level of precision for every 2020 program except Custom Incentives and the Lighting and Appliance survey for Appliance Rebate participants.

Table 8 shows planned and achieved survey responses. For all but two programs (SBDI and Appliance Recycling, for which we had trouble reaching participants), the evaluation team exceeded the number of target surveys to gather additional data points on specific measures.

Table 8. 2020 Survey Respondents by Program

Program (and Respondent Group)	Population (Participants)	Usable Sample	Sample Frame [a]	Target Completes	Achieved Completes	Response Rate	Precision [b]
Appliance Recycling (Participants)	2,149	1,928	611	140	155	25%	6% ±
Community Based Lighting (Participants) [c]	Unknown	0	N/A	N/A	26	N/A	N/A
IQW (Participants)	6,113	3,022	1,400	140	152	11%	7% ±
Lighting and Appliance (Appliance Rebate Participants)	693	341	341	70	54	693	11% ±
Lighting and Appliance (Marketplace Participants)	2,786	2,601	2,034	140	162	8%	6% ±
Whole Home (Participants)	13,874	6,598	2,100	210	256	12%	5% ±
Custom Incentives (Custom Participants)	45	45	45	Census	13	29%	19% ±
Prescriptive Rebates (Participants)	745	722	668	70	69	10%	9% ±
SBDI (Participants)	217	214	205	70	52	25%	10% ±

[a] This column reflects the sample frame (which may be smaller than the usable sample). The usable sample is the number of unique customers with an email address. In some cases, the population may not represent the entire 2020 participant group due to survey initiation prior to close of 2020.

[b] Precision is provided at the 90% confidence interval.

[c] The CBL program survey population is unknown because recipients of program bulbs respond to the survey by typing in a URL provided on the bulb packaging.

Cost-Effectiveness

To determine cost-effectiveness, the evaluation team conducted several procedures, discussed below and as specified in the IPL Evaluation Framework, which primarily drew upon California's *Standard Practice Manual*.[5] The evaluation team evaluated cost-effectiveness for each electric program implemented within IPL's service area.

EM&V and cost-effectiveness modeling are critical to the long-term success of energy efficiency programs. To understand cost-effectiveness, utilities and program administrators typically use a model that enables them to evaluate changes to individual programs and to the portfolio. The model usually allows for evaluating cost-effectiveness impacts from changes in numerous factors such as incentive levels, participant levels, measure savings, measure costs, avoided costs, end-use load shapes, coincident peak factors, NTG factors (spillover and freeridership), administrative costs, and adding or deleting measures or programs.

[5] State of California. July 2002. *California Standard Practice Manual: Economic Analysis of Demand-Side Programs and Projects*. http://www.calmac.org/events/SPM_9_20_02.pdf

The evaluation team used DSMore, a leading DSM and energy efficiency benefit/cost modeling tool. IPL has also relied on DSMore cost-effectiveness modeling results for its *ex ante* program planning and *ex post* evaluation.

In its simplest form, the cost-effectiveness of energy efficiency can be measured by comparing an investment's benefits to its costs. The *Standard Practice Manual* identifies five cost-effectiveness tests typically used to evaluate energy efficiency programs:

- The UCT, sometimes called the program administrator cost test
- The TRC
- The RIM
- The PCT
- The SCT

For this EM&V analysis, the evaluation team did not use the SCT (since we did not have estimates of environmental and other non-energy costs and benefits).[6] However, the TRC test results provide the closest proxy to the SCT results.

The four remaining cost-effectiveness tests address energy efficiency programs' impacts from different points of view within the energy system. Though each test provides a unique set of stakeholders' perspectives, together the tests provide a comprehensive view of program viability. IPL can also use the tests to improve program design by answering several types of questions:

- Is the program cost-effective overall?
- Are some program costs or incentives too high or too low?
- What will be each program's impact on customer rates?

The cost-effectiveness tests share a common structure, comparing total benefits to total costs in dollars from a certain point of view to determine whether overall benefits exceed costs. A program passes a cost-effectiveness test if it produces a benefit/cost ratio greater than 1.0, determined using the following equation:

$$Benefit/Cost\ Ratio = \frac{Benefits}{Costs} = \frac{NPV\ \sum benefits\ (\$)}{NPV\ \sum costs\ (\$)}$$

Table 9 and Table 10 present an overview of the four *Standard Practice Manual* tests the team used for this evaluation.

[6] Such costs and benefits can include the value of power plant emissions displaced (or avoided) by the programs' direct energy impacts, the direct and indirect effects of the flow of dollars on Indiana's economy, and economic benefits from increased equipment life, improved productivity, lowered waste generation, increased sales, reduced personnel injuries and illnesses, reduced repair and maintenance expenses, and increased property values.

Table 9. Overview of Cost-Effectiveness Tests

Test	Objective	Description
UCT	Will utility costs increase or decrease?	Program administration costs to achieve supply-side resource savings
TRC	Will the total cost of energy in the utility service territory decrease?	Program administrator and customer costs to achieve utility resource savings
RIM	Will utility rates increase?	Program administration costs and utility bill reductions to achieve supply-side resource savings
PCT	Are there positive benefits to the customer?	Costs and benefits to customers for installing measures

Table 10. *Standard Practice Manual* Costs and Benefits

Costs and Benefits	UCT	TRC	RIM	PCT
Avoided energy costs (fuel, operation, and maintenance of power plants and transmission and distribution lines)	Benefit	Benefit	Benefit	N/A
Avoided capacity costs (constructing power plants, transmission and distribution lines, and pipelines) [a]	Benefit	Benefit	Benefit	N/A
Other benefits (fossil fuel savings, water savings, equipment operation and maintenance)	N/A	Benefit	N/A	Benefit
Participants' incremental cost (above baseline) of efficient equipment	N/A	Cost	N/A	Cost
Program administration costs (staff and marketing)	Cost	Cost	Cost	N/A
Incentives (rebates)	Cost	N/A	Cost	Benefit
Lost utility retail margin/lower customer bills	N/A	N/A	Cost	Benefit

[a] Avoided energy and capacity costs reflect net energy and capacity impacts.

DSMore Overview

DSMore is a financial analysis tool designed to evaluate the costs, benefits, and risks of electric and natural gas energy efficiency programs and measures. The tool estimates the value of an energy efficiency measure at an hourly level, across distributions of weather, energy costs or prices, or both. This allows for assessing the risks and benefits of energy efficiency measures by examining energy efficiency performance and cost-effectiveness over a wide range of weather and cost conditions.

The tests address an array of weather conditions (including normal weather), along with various cost and market price conditions. Designed to analyze extreme conditions, DSMore allows the user to obtain a distribution of cost-effectiveness outcomes or expectations. The avoided costs for energy efficiency tend to increase with increasing market prices or more extreme weather conditions due to covariance between the load and the costs or prices. Understanding the manner in which energy efficiency cost-effectiveness varies under these conditions allows for a more precise valuation of energy efficiency and demand response programs.

Valuation or modeling methods that employ averages (annual use, monthly use, and weather normal load profiles) instead of actual and forecasted hourly usage and avoided costs, by definition, undervalue

energy efficiency and DSM programs, which tend to exhibit higher savings during times of higher avoided costs (from HVAC, weatherization, and demand response).

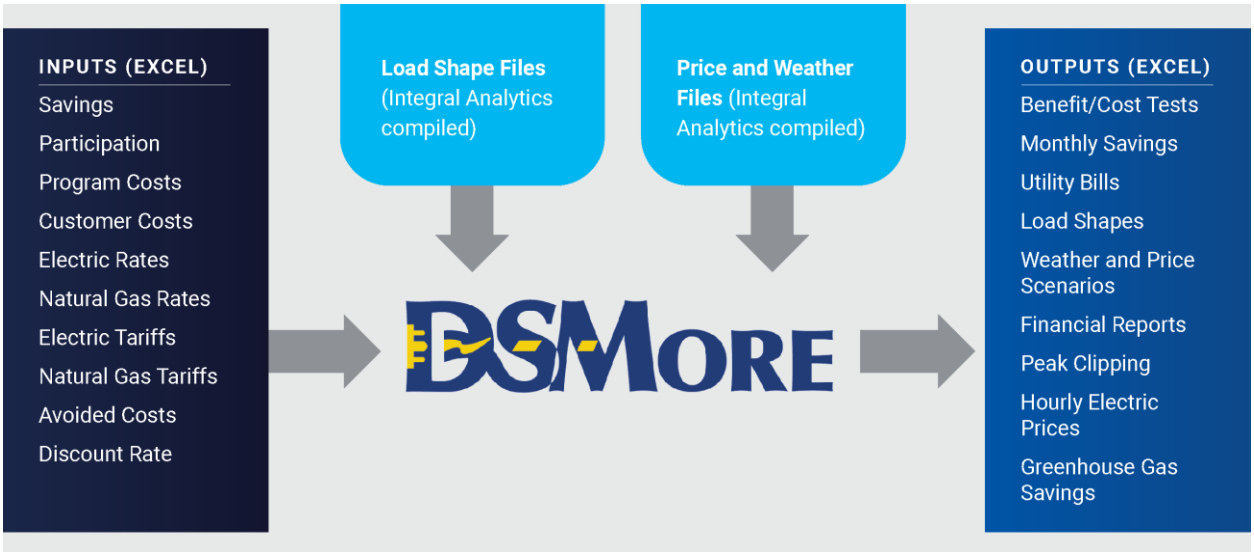
- For programs contributing to around-the-clock energy savings, the average results from several methods yield outcomes equivalent to DSMore results. Such programs, however, do not represent the norm (with the exception of some individual measures, such as refrigeration and lighting that is left on at all hours).
- In all other cases, averaging-based methods yield cost-effectiveness test results that are lower than actual values. The DSMore methods and algorithms avoid this potential error through a very granular use of hourly energy savings and hourly avoided costs, linked via the same set of actual, local hourly weather histories.

There is a four-step process for using DSMore:

1. Generally, DSMore requires the user to input specific information about the energy efficiency measures or programs they wish to analyze as well as a utility's cost and rate information. These inputs, which are entered into the first two tabs (worksheets) of an Excel file, enable the user to analyze a measure's or program's cost-effectiveness.
2. After entering the measure information data into Excel, the user selects the appropriate load file, selects the appropriate price file, and executes DSMore.
3. DSMore combines the user inputs with preconfigured electric and natural gas load shape and price data to calculate the cost-effectiveness test results. Integral Analytics created a custom set of hourly loads and prices, based on an analysis of 30 years or more, with load files specific to each customer class served by energy efficiency programs.
4. DSMore exports the cost-effectiveness test results into the same Excel file (as worksheet tabs 3 through 8).

Figure 7 provides an overview of DSMore and shows key inputs in relation to the model results.

Figure 7. DSMore Overview



It is important to capture the relationships between loads and prices. Table 11 shows two scenarios: one using *average* loads and prices and one using *hourly* loads and prices. Both scenarios examine the same average load (2 MW) and the same average price ($50 per megawatt-hour) over five hours. This example shows that the program's actual value is 24% higher when using hourly costs to estimate benefits, at $620, compared to using average pricing, at $500.

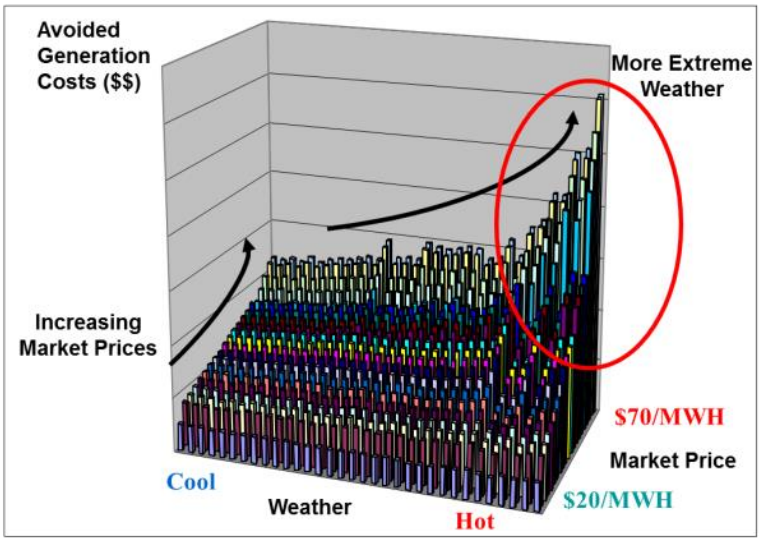
Table 11. Example of Average versus Hourly Valuation

Hour	Average Loads and Prices			Hourly Loads and Prices		
	MW	Cost/MWh	Total Cost	MW	Cost/MWh	Total Cost
1	2	$50	$100	1	$20	$20
2	2	$50	$100	1	$20	$20
3	2	$50	$100	2	$50	$100
4	2	$50	$100	3	$80	$240
5	2	$50	$100	3	$80	$240
Average	**2**	**$50**	**-**	**2**	**$50**	**-**
Total			**$500**			**$620**

To perform the hourly analysis, DSMore correlates historical loads and prices to historical weather records. The tool then uses the relationships (including the covariance) between loads, weather, and price, along with the probability distributions of these relationships, to simultaneously calculate 693 different market, load, and price scenarios, each with a unique test result, to reflect a full spectrum of possible valuations for a particular program. DSMore reports the endpoints or extremes of this distribution, then conveniently reduces the number of test results in the Excel output from 693 (typically 33 years of weather scenarios multiplied by 21 electric market, cost, and price scenarios) to between five and nine. The user can choose to simply use one test result that reflects their preferred set of avoided costs across normal weather conditions.

Figure 8 shows that the 693 DSMore weather and price scenarios captured the extremes, which an annual average avoided cost method would ignore.

Figure 8. DSMore Overview of Weather and Market Scenarios



The average value of these tests represents an average, weather-normalized expectation across all possible market prices and forward cost scenarios. Selecting one market price scenario (today's value) provides test results for the current market (this year) across 30 years or more of weather scenarios. Using fewer than 30 years of weather jeopardizes the accuracy of the estimated normal weather and extreme weather effects. DSMore is designed to reflect an appropriate range or distribution of highs to lows and to ensure that data reflect (and value) appropriate extreme hourly weather patterns, given historically observed extreme hourly weather.

The key benefit of valuing energy efficiency across such a wide range of future cost and weather conditions is its ability to not only quantify short-run cost-effectiveness, but to create long-term predictions (shown as the DSMore Option Test result). The long-run test has come to be called the Option Test, as energy savings can be viewed as options (even though it may be impossible to execute as an option, such as for installed equipment that cannot be removed) in comparison to paying for future, potentially higher avoided cost conditions. Essentially, the Option Test result values programs across 21 future possible sets of avoided costs and across 30 to 40 years of actual hourly weather patterns.

Traditionally, utilities only calculate one test result for the current year's avoided costs. However, energy prices tend to boom and bust over time, reaching high prices during periods of short supply (such as in 1999 and 2000) and having low avoided costs during periods of excess supply (such as in 2003 and 2009). Valuing energy efficiency programs across all possible future avoided cost possibilities makes it easier to determine whether programs will be cost-effective for all future possibilities (rather than just for the current year), creating meaningful short-run and long-run test results. For example, if the short-run current year test produces a result of 0.9, and the long-run Option Test produces a result of 1.3, it may be preferable to retain the program for a couple of years.

Net-to-Gross Methods

There are two components of NTG: freeridership and participant spillover:

$$Program\ NTG = 100\% - Freeridership + \ Participant\ Spillover$$

Freeridership is the percentage of savings that would have occurred in a program's absence, from participants who would have behaved in the same manner (such as purchasing the same measures) without the program's influence. Participant spillover occurs when customers purchase energy-efficient measures or adopt energy-efficient practices due to their experience with a program, marketing, or training or due to another portfolio-wide influence (not related to their participation in a utility-sponsored program).

$$Program\ NTG = 100\% - Freeridership + \ Participant\ Spillover$$

The team employed a standard self-report method for all programs requiring NTG estimates. We implemented this overall framework in various ways, depending on a program's design and measure mix, structure, and elements. For example, for the ARP, Whole Home, and Lighting and Appliance programs, the evaluation team first estimated measure-level freeridership as an input to measure-level impact calculations, then combined the measure-level results to provide a program NTG. For the Custom Incentives, Prescriptive Rebates, and SBDI programs, we estimated program-level NTG based on a sample of projects, creating separate NTG estimates for the Strategic Energy Management and Retro-Commissioning components of the Custom Incentives program due to the different implementation strategies. For School Kits, the team applied the NTG value developed in the 2018 evaluation.

The evaluation team combined two freeridership methods—the self-report method and the intention/influence method (following the same method we had used in the past three evaluations)—to evaluate freeridership for the Prescriptive Rebates program, Custom Incentives program, Whole Home program–rebated HVAC measures, and Lighting and Appliance program appliance rebate measures and IPL Marketplace measures. The team computed a savings-weighted average of the freeridership derived from each method to determine the overall freeridership for each program.

The team did not conduct NTG self-report surveys for Demand Response and Peer Comparison because the regression modeling and billing analysis produced a net savings estimate. The evaluation team deemed NTGs of 100% for the CBL, IQW, and MFDI programs' direct-install measures and for non-surveyed measures provided via direct install through the Whole Home program.

Self-Report Method

To determine freeridership, the evaluation team relied on self-report surveys, in which participants answered a series of *intention* focused questions regarding actions they would have taken in the program's absence and a series of *influence* focused questions about how influential certain program elements were on their purchasing decision. The team used each unique set of responses to calculate *intention* and *influence* freeridership scores for each individual, then we aggregated the savings-weighted *intention* and *influence* freeridership scores to determine a total freeridership score for each program or, where applicable, for each measure. To facilitate year-over-year comparisons, the team used sets of NTG questions consistent with those used in the 2016, 2017, 2018 and 2019 evaluations.

To measure spillover, survey participants who purchased a particular measure answered whether, because of the program or their experience with IPL, they installed other energy-efficient measures or conducted other activities to improve energy efficiency. The survey included a list of energy-efficient products and respondents indicated if they had installed any of those products in their home or business since participating in the program. Respondents who had made energy-efficient improvements or purchased products then rated how influential the program was on their purchasing or improvement decision.

The evaluation team followed a deemed approach to calculating savings from spillover measures. Specifically, the team applied deemed savings values to measures that the program was *very influential* in causing participants to undertake. Deemed per-measure savings values were consistent with those used to calculate the gross program savings value. The sum of these savings values, divided by savings achieved through the program for each relevant measure, yielded spillover savings as a percentage of total savings, which the team then extrapolated to the population of program participants.

The evaluation team did not evaluate participant spillover for the Whole Home program due to the uncertainty of the savings overlap between audit recommendation activities and reported spillover activities.

Intention/Influence Method

The evaluation team assessed freeridership following the two-step intention/influence method. By savings weighting an *intention* methodology with an *influence* methodology, the evaluation team produced a program freeridership score.[7] The team calculated the arithmetic mean of *intention* and *influence* freeridership components to estimate final program freeridership:

$$\text{Final Freeridership} = \frac{Intention \text{ Freeridership Score } + Influence \text{ Freeridership Score}}{2}$$

Higher total freeridership scores lead to greater deductions from gross savings estimates.

To determine spillover under this method, the team focused on the program's (and incentive's) *influence* on a participant's decision to invest in additional energy-efficient measures, rated as *very important*, *somewhat important*, *not too important*, or *not at all important*.

Deemed Method

The evaluation team applied a deemed NTG of 100% to the CBL, IQW, and MFDI programs' direct-install measures and to non-surveyed measures directly installed through the Whole Home program. Low-income programs tend to focus on the direct installation of measures, based on the hypothesis that the customer would not have installed the energy-efficient product without program assistance. The MDFI program's direct-install channel operates under the hypothesis that tenants would not participate without receiving free services through their landlords. Since the manufactured homes portion of the program is also direct install, the evaluation team used a deemed NTG of 100% for manufactured home

[7] *Intention* and *influence* freeridership scores both have a maximum of 100%.

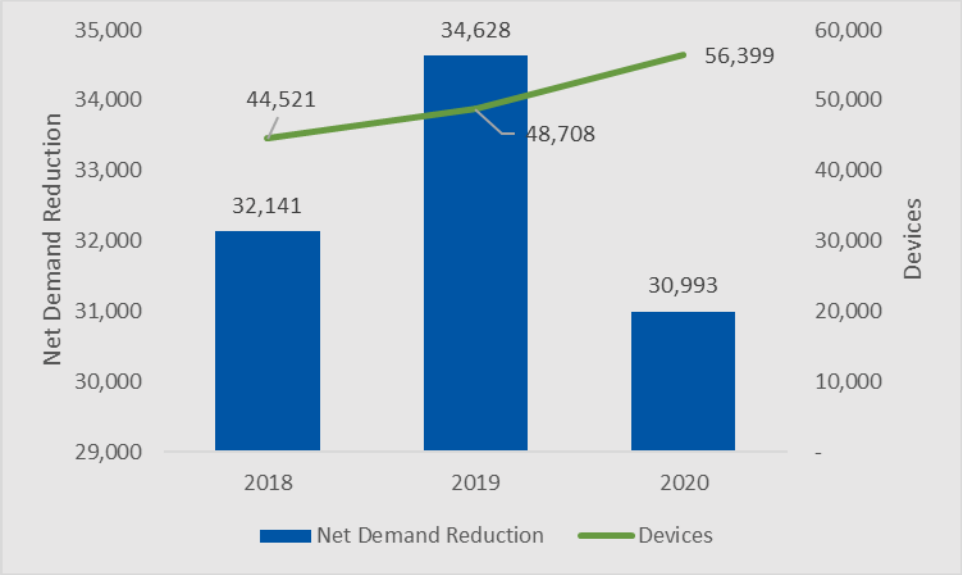
measures (because, while limited in number, participant interviews in 2018 supported this approach). For MFDI program kit measures, the team applied NTGs from the 2017 IPL participant survey results.

The team deemed NTGs of 100% for Whole Home program measures where no surveys were completed in 2020: duct sealing, heat pump water heaters, water heater setback, hot water heater pipe wrap, central air conditioner (central AC) tune-up, heat pump tune-up, weatherization measures, and audit recommendations. Additional details regarding NTG methods are outlined in *Appendix B*.

Demand Response Program

Through the Demand Response program (known as CoolCents in customer-facing materials), IPL reduces peak demand by controlling participant cooling equipment during periods of peak system demand, delivery constraints within certain load zones, or high locational marginal prices. IPL does this by remotely communicating to smart thermostats or direct-load air conditioning (AC) control switches, then using these devices to control system load (during times known as events). The residential side of the program achieved 76% of its demand reduction goal and 120% of its energy-savings goal and the C&I side achieved 30% of its demand reduction goal[8]. The participation rate, reflected in the difference between audited and verified savings, mainly drove the realization rates for both sectors. Updates to the impact scaling factors for commercial devices based upon the AC tonnages shown in the program tracking data also resulted in lower per-unit impacts for commercial L+G switches than in previous years (Figure 9).

Figure 9. Demand Response Program Participation and Demand Reduction, 2018-2020



Program Description

IPL designed its demand response season to span from June 1 to September 30, yet has the ability to call an event for switches starting on May 1. Residential and C&I customers can receive up to $20 in bill credit per device across the program season. In 2019, events lasted three hours (beginning at 1 p.m. and ending at 4 p.m.). In 2020, IPL extended the event duration to four hours (beginning at 1 p.m. and ending at 5 p.m.). CLEAResult implemented the program in 2020.

Table 12 outlines the technologies and control strategies for nearly 56,399 devices enrolled in the 2020 Demand Response program (up from approximately 50,000 in 2019). Cannon switches held the largest share, with nearly 37,085 participating devices (down from approximately 40,000 devices in 2019). IPL is gradually replacing Cannon switches with L+G switches and smart thermostats—in the 2020 program

[8] There was no energy savings goal for C&I.

season, more than 19,173 customers participated with smart thermostats (up from approximately 6,500 customers in 2019), which comprised 33.9% of all participating devices. Smart thermostat participants collectively more than doubled in 2020 compared to the 2019 program season, when only 14.6% of all participating and verified devices were smart thermostats (specifically Nest smart thermostats).

Residential customers can join the program with their existing Nest, Ecobee, or Honeywell smart thermostat. Residential customers who enrolled in 2020 used their existing smart thermostat, received a free new smart thermostat if they completed an eScore Home Energy Assessment, or received an L+G switch if they did not complete an eScore assessment and do not have a home that is compatible with a smart thermostat. C&I customers who enrolled in 2020 received L+G switches.

Table 12. Summary of 2020 Demand Response Program Device Features

Cannon Switches	L+G Switches	Smart Thermostats (Nest, Ecobee, and Honeywell)
Communication Strategy		
One-way communication limits the ability to verify that the switch is operational (nonparticipation rates) [a] or to capture post-event impacts without installing loggers.	Two-way communication provides the ability to verify that the switch is operational (nonparticipation rates) and provides logger data for calculating post-event impacts.	Two-way communication provides the ability to verify that the switch is operational (nonparticipation rates and opt-out rates) and provides fan and compressor runtime data for calculating post-event impacts.
Cycling Strategy		
Adaptive cycling to reduce historical run times by 50% during an event.	50% cycling strategy (15 minutes on and 15 minutes off throughout event).	Household-specific setpoint adjustments (typically of 2°F or 3°F above the customer's AC temperature setpoint) based on a home's characteristics and thermal footprint.
Event Notifications		
No event notifications provided to participants, resulting in very limited opt-outs.	No event notifications provided to participants, resulting in very limited opt-outs.	Event notifications via app and device may encourage behavioral adjustments and higher opt-out rates.
Customer Energy Management Benefits		
None	None	Potential load shift and energy-savings impacts given thermostat optimization and customer education.
[a] Nonparticipation rates reflect the number of customers and devices that did not participate in events because of a technical failure with the device, as opposed to opt-out rates, which capture rates of nonparticipation due to customer behavior, such as disrupting the cycling strategy during an event to turn on the AC.		

Research Objectives

For this study, the evaluation team assessed the Demand Response program impacts for all devices and calculated energy savings from smart thermostats. This section summarizes evaluation efforts for the residential and C&I sectors, with evaluation tasks described in the *Impact Evaluation Methods* section below. There were several research objectives:

- Assess the demand reduction for each device per event and for the control season
- Estimate the energy savings associated with thermostats

- Estimate the nonparticipation rates by device
- Document any changes to the program design and delivery
- Document program recruitment and marketing strategies
- Assess program goal achievement

Research Approach

To explore these research objectives, the team conducted several activities:

- Interviewed IPL staff
- Reviewed participant tracking databases against claimed savings
- Constructed regression models to estimate demand impacts for Cannon switches, L+G switches, and smart thermostats as well as energy savings for smart thermostats; these regression models predicted what demand would have been during the event had the event not been called (known as the *baseline*), then the evaluation team subtracted the observed demand for each hour during the event, resulting in demand impact estimates for each device type and each event hour.

Program Performance

Table 13 shows the reported program energy savings, demand reduction, participation, and budget. IPL established a demand reduction goal of 40,449 kW for residential devices and 778 kW for C&I devices, as well as a residential energy-savings goal of 503,030 kWh for smart thermostat installations. The demand reduction goals included both event-based demand impacts and non-event peak coincident demand reduction resulting from the increased efficiency associated with installing a smart thermostat. The residential devices achieved 76% of the demand reduction goal and 120% of the energy-savings goal. The C&I devices achieved 30% of the demand reduction goal.

Table 13. 2020 Demand Response Program Expenditures, Participation, and Savings by Segment

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Residential			
Net Energy Savings (kWh)	503,030	605,027	120%
Net Demand Reduction (kW)	40,449	30,761	76%
Participation (Devices)	64,980	43,254	67%
Budget	$3,686,274	$3,053,524	83%
Commercial and Industrial			
Net Energy Savings (kWh)	0	0	N/A
Net Demand Reduction (kW)	778	232	30%
Participation (Devices)	1,945	300	15%
Budget	$133,795	$99,759	75%
Total Program Energy Savings (kWh)	**503,030**	**605,027**	**120%**
Total Program Demand Reduction (kW)	**41,227**	**30,993**	**75%**

Note: Values rounded for reporting purposes

[a] Goals per IPL's Settlement in DSM Cause #44945.

Differences in verified and audited quantities, which reflect estimated rates of nonparticipation due to technical failures with devices, mainly drove differences between residential demand reduction *ex ante* and evaluated *ex post* demand reduction. Though IPL did not report per-unit *ex ante* demand reductions by device type, the evaluation team found average per-unit *ex post* demand reductions very similar to the average reported per-unit *ex ante* savings. However, for C&I devices the evaluation team found much smaller *ex post* savings per unit than reported.

Residential customers who received a smart thermostat through the Demand Response program in 2020 contributed to the energy savings. The evaluation team determined *ex post* per-unit energy savings for each smart thermostat by prorating annual energy savings based on installation and de-enrollment dates. The team also considered the proportion of 2020 annual cooling degree days (CDDs) each device was installed for when determining *ex post* savings. Prorating energy savings resulted in a lower percentage of the goal being met. The team evaluated a similar energy realization rate for the 2019 evaluation.

Table 14 shows a summary of the evaluated results (audited, verified, *ex post* gross, and *ex post* net savings) for the 2020 program. The *ex post* values shown include both event-based and non-event-based savings. Event-based savings come from all participating devices, while only the smart thermostats delivered through the program contribute to non-event-based savings (as opposed to previously owned smart thermostats or smart thermostats a customer received through an IPL program such as IQW or Whole Home).

Table 14. 2020 Demand Response Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	1,322,131	2,113,237	390,771	605,027	605,027
Demand Reduction (kW)	40,439	41,170	31,461	30,993	30,993

The *Program Events and Cycling Strategies* section provides detailed descriptions of devices and events.

Program Events and Cycling Strategies

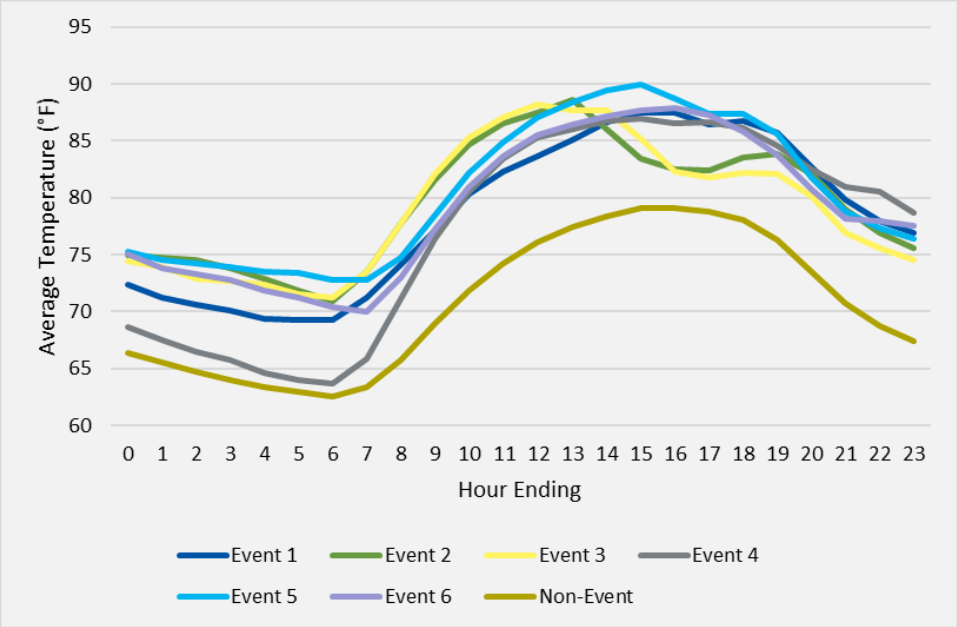
In 2020, IPL called six demand response events for all devices. Table 15 shows dates, days of the week, times, and temperatures during events.

Table 15. 2020 Demand Response Program Events

Event Date	Day of Week	Event Time	High Temperature	Mean Temperature
July 1, 2020	Wednesday	1 p.m. to 5 p.m.	87.49°F	87.00°F
July 7, 2020	Tuesday	1 p.m. to 5 p.m.	86.07°F	83.59°F
July 8, 2020	Wednesday	1 p.m. to 5 p.m.	87.66°F	84.25°F
July 15, 2020	Wednesday	1 p.m. to 5 p.m.	87.00°F	86.74°F
August 25, 2020	Tuesday	1 p.m. to 5 p.m.	89.94°F	88.85°F
August 26, 2020	Wednesday	1 p.m. to 5 p.m.	87.88°F	87.50°F

Figure 10 shows average hourly temperatures from June through September on non-event days and actual temperatures on the six summer 2020 event days. As expected, event days were substantially warmer than average non-event days during the demand response season. Across events, temperatures were hottest during the fifth event (August 25, 2020). Notably, the temperature dropped several degrees during the second and third events, when precipitation and wind picked up.

Figure 10. Average Hourly Temperature on 2020 Demand Response Program Event and Non-Event Days



Cannon and L+G Switches

Cannon switches reduce AC runtimes during events by using an adaptive learning strategy to determine a custom 50% reduction for each participant. L+G switches cycle AC units off and on in 15-minute intervals to reduce actual usage throughout the event.

The difference in demand reduction between adaptive (Cannon) and simple (L+G) cycling strategies can vary considerably based on temperatures and settings during the learning days. There is not a consistent adjustment factor to correct for different demand reduction levels produced by different cycling strategies, even after controlling for timing and weather conditions during event days. Consequently, it is inappropriate to apply demand reduction estimates from L+G switches to Cannon switches (or vice versa), even after regression models correct for differences in weather conditions.

Smart Thermostats

In 2020, IPL allowed customers to participate in Demand Response program events with Nest, Ecobee, or Honeywell smart thermostats, the same as in 2019. Prior to 2019, only Nest smart thermostats were included in the program.

Unlike load control switches, such as those previously offered through the Demand Response program, smart thermostats do not use a standard setback or cycling strategy. Instead, Nest, and Ecobee thermostats use an adaptive temperature setback with precooling. The magnitudes of the temperature setback and precooling are customized to reflect each customer's preferences and the thermal profile of their home; this helps to avoid manual adjustments during the event and to maximize demand reduction. During device installation, manufacturers encourage customers to let the thermostat "learn" their most efficient schedule for the first week based on occupancy patterns and behavior. The thermostats collect information regarding thermal loads, humidity, occupancy, outside temperatures, and forecasted temperatures to develop a cooling algorithm specific to each customer.

One hour prior to a demand response event, customers receive an IPL and manufacturer co-branded notification on their smartphone app indicating that an event will be called within an hour. When the demand response event occurs, a gold gear icon turns green. The demand response event adjustment occurs even when customers are in Auto Away mode—a setting they can use to save energy when they are away from home.

Impact Evaluation Methods

The evaluation team calculated separate savings estimates for each device and sector, using different methodologies to determine demand reduction and energy savings.

Data Collection

The team collected several types of data from IPL and CLEAResult to evaluate event demand reduction and annual energy savings:

- ***Program tracking data.*** CLEAResult provided customer enrollment information, including device manufacturers (Cannon, L+G, Nest, Ecobee, and Honeywell), device serial numbers, installation dates, zip codes, and other household information for all devices enrolled in the program since 2001. These data also included *ex ante* energy-saving estimates for smart thermostats provided to participants through the program.
- ***L+G logger data.*** IPL provided logger data (AC consumption in five-minute intervals) covering the 2020 event season for L+G switches in the program.
- ***Nest thermostat runtimes.*** Google provided fan and compressor runtimes in 15-minute intervals covering the 2020 event season for Nest thermostats in the program.
- ***Nest thermostat participation status.*** Google provided event tracking data for each Nest thermostat, including whether the device was called for an event and if a participant modified settings during an event.
- ***Ecobee thermostat runtimes.*** CLEAResult provided event-day fan and compressor runtimes in five-minute intervals covering the 2020 event days for each Ecobee thermostat in the program.
- ***Honeywell thermostat mode status*.** CLEAResult provided interior temperatures and the timestamps at which each thermostat's mode changed during the 2020 event season. However, as explained below, these data were insufficient to evaluate the demand reduction from Honeywell thermostats.

With these data, the evaluation team estimated 2020 event demand reduction for L+G switches and Ecobee and Nest smart thermostats and annual energy savings for smart thermostats. Collecting data from Cannon switches requires on-site extraction, which is time consuming and costly. To estimate 2020 demand reduction for Cannon switches, the team adjusted the 2017 demand reduction[9] to reflect 2020 weather conditions. Likewise, due to the unavailability of runtime data from Honeywell, and the relatively small number of Honeywell thermostats enrolled in the program, the team conducted a similar adjustment of Honeywell thermostats' 2019 demand reduction to calculate impacts in 2020.

Demand Response Impact Estimation Methods

To calculate program total demand reduction per event, the evaluation team estimated per-unit demand reduction for each device type, applied per-unit demand reduction to all audited devices, and incorporated nonparticipation rates; each step is described below, with details provided in *Appendix C*.

Per-Unit Ex Post Savings

The evaluation team received data separately for Cannon switches, L+G switches, and from Nest and Ecobee. We determined the method for estimating per-unit *ex post* savings based on the data type we received, as described in the following sections.

Cannon Switches

Collecting data from Cannon switches requires access to the physical device. Using demand reduction estimated for 2017 events (the last evaluation in which Cannon logger data was available), the team regressed hourly event reduction on hourly temperature to determine the change in demand impacts resulting from a one-degree change in temperature. We then used this relationship to predict 2020 demand impacts based on the temperature observed during actual event hours in 2020. Nonparticipation rates were collected in 2020 and applied to this evaluation cycle.

There are several limitations to this approach:

- In the absence of customer-level data, the evaluation team used the aggregated demand impacts reported for the 2017 event season to estimate 2020 event demand reduction. This limited us to four available observations for regressing demand reduction on temperature: two hourly observations each from the September 21 and September 22, 2017 events.
- The two events called in 2017 occurred on days with higher mean and maximum temperatures than observed during event days in 2020, especially for the second and third events. The evaluation team estimated 2020 demand reduction assuming a constant, linear relationship with temperature, then extrapolated for temperatures outside the range of those occurring during 2017 events.
- Numerous factors could render the data unrepresentative of 2020 event season conditions. Although the previous evaluation controlled for changes in weather, any changes in customer demographics and usage patterns not driven by weather (including more participants being at home during the 2020 events due to the COVID-19 pandemic) are not be captured by the analysis.

[9] Cadmus, Opinion Dynamics, and Integral Analytics. June 28, 2018. *2017 Demand-Side Management Portfolio Evaluation Report*. Prepared for Indiana Power & Light.

L+G Switches and Smart Thermostats

IPL provided the evaluation team with logger data covering the 2020 event season for 4,822 L+G switches (of 5,468 devices enrolled in the program tracking data). The evaluation team aggregated data to the hourly level by summing the AC wattage across all five-minute intervals within an hour. The team also collected data for Nest and Ecobee smart thermostats, but not from Honeywell. The Nest data did not include wattage information, instead providing fan and compressor run times for each device in 15-minute intervals across the event season. The team used HVAC engineering formulas, along with assumptions about the average size (tons) and efficiency levels (EER) of participating ACs and the average indoor return air temperatures, to convert the run times to wattages, then aggregated these to the hour. The evaluation team collected similar data for Ecobee thermostats and converted cooling and fan runtimes to wattages accordingly.

The team estimated per-unit demand reductions separately for each type of device and manufacturer by constructing regression models to predict what demand would have been during the event had the event not been called (the baseline), then subtracting the observed demand for each hour during the event. The difference between the baseline and observed demand provides the savings for each event. The team used non-event days (selecting the 20 non-event weekdays with the highest average temperatures) and cooling degree hours (CDHs) to model consumption and estimate baselines for L+G switches, Nest thermostats, and Ecobee thermostats. Model specifications are provided in *Appendix D*.

A notable limitation of this approach is that non-event days, which were used to construct the baseline for L+G switches, Nest thermostats, and Honeywell thermostats, may not reflect how participants' would have used their ACs on the event day had the event not been called. Event days are inherently different from non-event days specifically because of the weather or grid conditions that influenced IPL to call the demand response event. The team controlled for weather when modeling AC usages, but the baseline would be more accurate if we used a randomized control group.

Nonparticipation Rates

For L+G switches and smart thermostats, the evaluation team estimated the number of devices participating in each event by calculating a nonparticipation rate: this is the number of devices for which the team received usable logger/cooling data divided by the number of devices for which the team received any logger/cooling data. The evaluation team assumed that unusable data indicated a technical failure with the device that rendered it unable to participate in events.

It was not possible for us to use this same method to determine nonparticipant rates for Cannon switches. As one-way communicating devices, there is no way to confirm whether a customer participated in events without assessing the physical Cannon switch. For previous evaluations of these devices, the team relied on data that was collected in 2013, when we documented the number of operational, failed, and missing load control switches by premise type for the sample. In 2020, IPL visited a randomly selected sample of sites to refresh these data. At each site IPL determined whether the Cannon switches were connected, disconnected, or missing. Per IPL's site visit data, 69% of the Cannon switches were connected and 31% were disconnected or missing. The evaluation team applied this 31% nonparticipation rate to 2020 events.

The team multiplied per-unit *ex post* savings by the estimated number of participating program devices to calculate net *ex post* savings for each device and sector.

Ex Post Demand Reduction

The evaluation team used the hourly per-unit *ex post* savings to estimate total *ex post* savings for the residential and C&I portions of the Demand Response program. For each residential device, the team calculated the average per-unit *ex post* savings across all hours within an event, then multiplied the event-level per-unit savings by the number of verified devices in each event. The team calculated separate total *ex post* savings for each device as the average event-level savings, then combined these to determine total residential sector savings.

Because of the small number of C&I customer devices in the L+G logger data, the evaluation team did not estimate separate per-unit *ex post* savings for residential and C&I customers with L+G switches. Instead, the team weighted the per-unit residential *ex post* savings estimated for Cannon and L+G switches by the average AC tonnage of C&I participants to reflect differences in usage patterns between residential and C&I customers. This method assumed a linear relationship between AC tonnage and demand impacts during events, but provided the best approach given data limitations.

Ex Ante Forecast Per-Unit Savings

For each device, the evaluation team estimated *ex ante* net impacts to forecast future demand response impacts under normal weather conditions. We closely followed the methods used to estimate *ex post* per-unit demand reduction, but modeled event savings as a function of weather (CDHs) during the event, then calculated the average CDHs during the summer event window (1 p.m. to 5 p.m.) using TMY3 weather data from the Indianapolis International Airport weather station. The team used the event savings model to predict what hourly demand would have been during events under average weather conditions.

Energy-Savings Impact Estimation Methods

The evaluation team estimated non-event-based energy savings and demand reduction for customers who received a free smart thermostat in 2020 after completing a virtual Home Energy Assessment through the Whole Home or IQW programs. The team reviewed the 2020 program tracking data for these programs and discovered that there was very little overlap in participation between Whole Home or IQW and the devices with claimed energy savings shown in the Demand Response program tracking data. In addition, energy savings were already claimed for the devices listed in the Whole Home and IQW tracking data. For this reason, the team excluded devices shown in the Whole Home or IQW program in evaluating 2020 ex-post non-event-based energy savings and demand reductions. The team conducted an engineering analysis to determine energy savings and non-event-based demand impacts associated with installing a smart thermostat—attributable to increased energy efficiency across the entire year rather than during a single event. The team calculated *ex post,* per-measure energy savings for smart thermostats using algorithms and variable assumptions from the Indiana TRM (v2.2), which assumed zero non-event demand impacts for smart thermostats. The team calculated non-event-based

ex post demand reduction using the Illinois TRM (v6.0)[10] and, when data were unavailable in the Indiana TRM (v2.2), the team referenced the *2009 Residential Energy Consumption Survey*[11] data and the 2012 *Residential Baseline Study* in Indiana.[12] The evaluation team used installation dates and de-enrollment dates provided in the residential tracking data to prorate annual savings for each smart thermostat, weighting annual deemed savings by CDDs.

Ex post net savings estimates typically reflect savings attributed to the program after adjusting for freeridership and spillover by applying a NTG estimate. However, the evaluation team used a regression model to estimate impact results, which inherently accounts for net effects.

Impact Evaluation Results

This section reports 2020 demand response load impact estimates (*ex post*) and forecasted demand response impacts (*ex ante*) for all five types of devices and energy-savings impacts for smart thermostats.

Demand Response Impacts

This section outlines the variables for demand reduction that customers achieved by participating in at least one of the six 2020 summer events.

Per-Unit Ex Post Savings

Table 16 summarizes average *ex post* event impacts for each device. Due to the small number of enrolled C&I customers for which we received logger data, the evaluation team estimated demand reductions for devices installed in residential or C&I buildings together. Nest smart thermostats achieved the highest overall demand reduction, at 1.25 kW per device, followed by Ecobee thermostats (which achieved 0.71 kW per device on average) and Cannon switches (0.66 kW). Honeywell thermostats and L+G switches achieved lower impacts (0.51 kW and 0.41 kW, respectively).

Across all device types, smart thermostats generally achieved the largest impacts—an expected result, given the different cycling strategies employed for smart thermostats (which make customer-specific adjustments based on household characteristics and preferences). However, the results for 2020 differed from the results for 2019, especially for Nest and Ecobee smart thermostats. In 2019, the evaluated savings were 0.71 kW for Nest thermostats and 1.07 kW for Ecobee thermostats. Nest thermostats saved substantially more in 2020 than in 2019, while Ecobee thermostats saved less. While

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[10] Illinois Energy Efficiency Stakeholder Advisory Group. October 17. 2019. 2020 Illinois Statewide Technical Reference Manual for Energy Efficiency Version 6.0. "Volume 3: Residential Measures." http://ilsagfiles.org/SAG_files/Technical_Reference_Manual/Version_6/Final/IL-TRM_Effective_010118_v6.0_Vol_3_Res_020817_Final.pdf

[11] U.S. Energy Information Administration. *2009 Residential Energy Consumption Survey*. https://www.eia.gov/consumption/residential/data/2009/

[12] TecMarket Works, Opinion Dynamics, and Cadmus. November 2, 2012. *2011 Residential Baseline Report*. Prepared for The Indiana Demand Side Management Coordination Committee. https://aceee.org/files/pdf/2012-indiana-emv-report.pdf

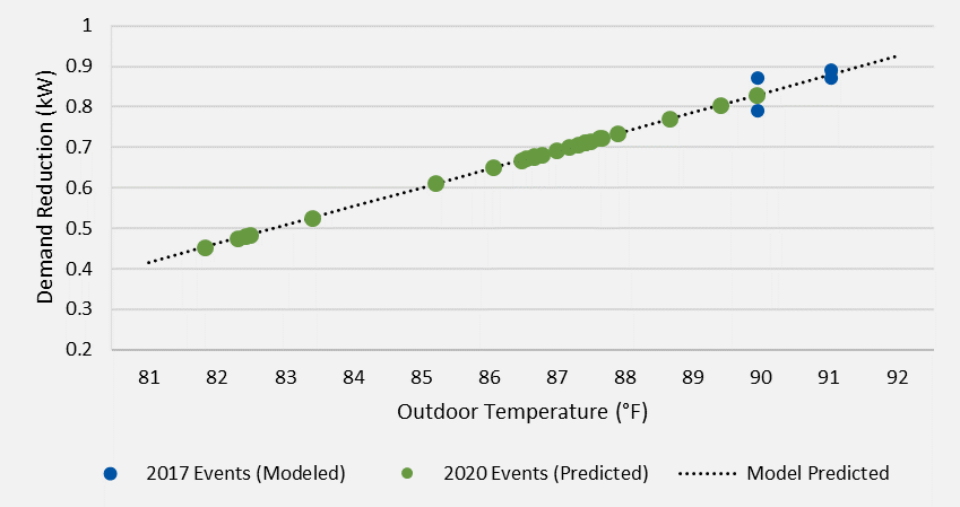
decreases in per-unit savings for the Ecobee devices can be explained by lower average temperatures during 2020 event hours than during 2019 events (86°F in 2020 versus 88°F in 2019), the substantial increase in savings from Nest devices is unexpected. As we discuss in *Appendix D*, these changes may result in part from bad runtime data from one or both thermostat manufacturers.

Table 16. 2020 Demand Response Program Evaluated *Ex Post* Residential Event-Based Demand Response Impacts

Device	Average *Ex Post* Modeled Demand Reduction (Per-Unit kW)	Standard Error	Relative Precision at 90%
Nest	-1.25	0.013	±1.70%
Ecobee	-0.71	0.006	±1.30%
Cannon Switch	-0.66	0.104	±25.9%
Honeywell	-0.51	0.095	±31.0%
L+G Switch	-0.41	0.011	±4.42%

As described in the *Demand Response Impact Estimation Methods* section, the evaluation team estimated 2020 demand impacts for Cannon switches by modeling 2017 demand reduction on temperature (the evaluation scope did not include collecting device-level data for Cannon switches for the 2018, 2019, or 2020 evaluations due to cost). Figure 11 shows the 2017 evaluated demand reduction (blue dots) and the temperature on event days, which we used to build the model predictions (gray dotted line). As expected, demand reduction increased as outdoor temperature increased. The team used the relationship between demand reduction and temperature to predict 2020 demand reduction (green dots) for all six events and all event hours. Figure 11 shows that outdoor temperatures during event hours in 2020 were lower than those of event days in 2017. The evaluation team assumed that the relationship between demand reduction and outdoor temperature remained unchanged at lower temperatures.

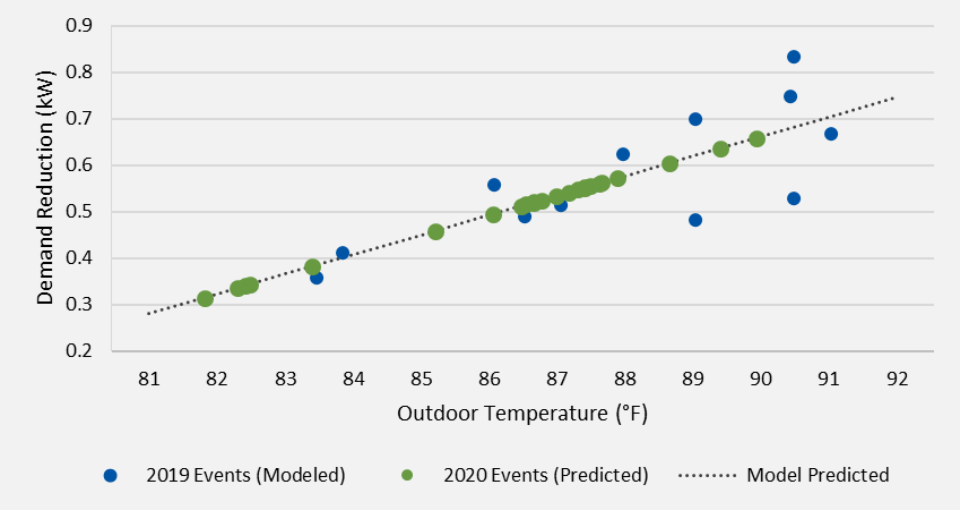
Figure 11. Demand Reduction for Cannon Switches by 2020 Demand Response Program Event and Hour



Notes: The model predicted line shows the estimated linear relationship between temperature and demand reduction. Modeled 2017 events (blue) show the observations used to build the model predicted line. Predicted 2020 events are shown in green.

Honeywell runtime data from 2020 were unavailable for analysis, so the evaluation team used the same method described above to estimate demand reductions from Honeywell thermostats in 2020. We used Honeywell results from the summer 2019 analysis to predict event impacts as a function of outdoor temperature. Summer 2019 events provided a substantially wider range of outdoor temperatures and event hours for Honeywell devices than were available for the Cannon switch analysis. As shown in Figure 12, the model-predicted values fit well to the apparent relationship between temperature and demand reductions among 2019 events throughout the temperature range, suggesting that the predicted values for 2020 events are reasonable.

Figure 12. Demand Reduction for Honeywell Thermostats by 2020 Demand Response Program Event and Hour



Notes: The model predicted line shows the estimated linear relationship between temperature and demand reduction. Modeled 2019 events (blue) show the observations used to build the model predicted line. Predicted 2020 events are shown in green.

Figure 13 through Figure 18 show hourly demand reduction from the six 2020 events for L+G switches, while Figure 19 through Figure 24 show this for Nest smart thermostats and Figure 25 through Figure 30 show this for Ecobee smart thermostats. The figures also show impacts observed during pre- and post-event hours. All six events began at 1 p.m. and lasted four hours (ending at 5 p.m.). All devices followed the same event start and stop times. Immediately following all six events, consumption increased relative to the baseline, suggesting evidence of snapback: an increase in load immediately after the end of an event due to participants increasing their cooling usage in post-event hours more than they would have if the event had not been called. While precooling and snapback do not affect event-based demand reduction (because the increases in load only occur outside the event window), these results highlight that on event days, load is shifted away from peak hours to pre-event hours (through precooling) and to post-event hours (through snapback), as expected for event-based demand response programs.

The following figures for L+G switches show increases in demand in the hours prior to and immediately following each event. Except for the first event, during which it appears that the L+G switches were not

activated (or did not respond due to technical malfunction, resulting in negative savings), demand reduction remained generally stable across event hours. L+G switches typically achieved higher savings toward the end of an event (between 3 p.m. and 5 p.m.). The stability of demand reductions across event hours (excluding the first, failed event) and the increase in reduction toward the end of each event (corresponding with higher baseline AC runtime in these hours) reflects the cycling strategy employed by the L+G switches.

Figure 13. L+G Switch Demand Reduction from 2020 Demand Response Program Event 1

Figure 14. L+G Switch Demand Reduction from 2020 Demand Response Program Event 2

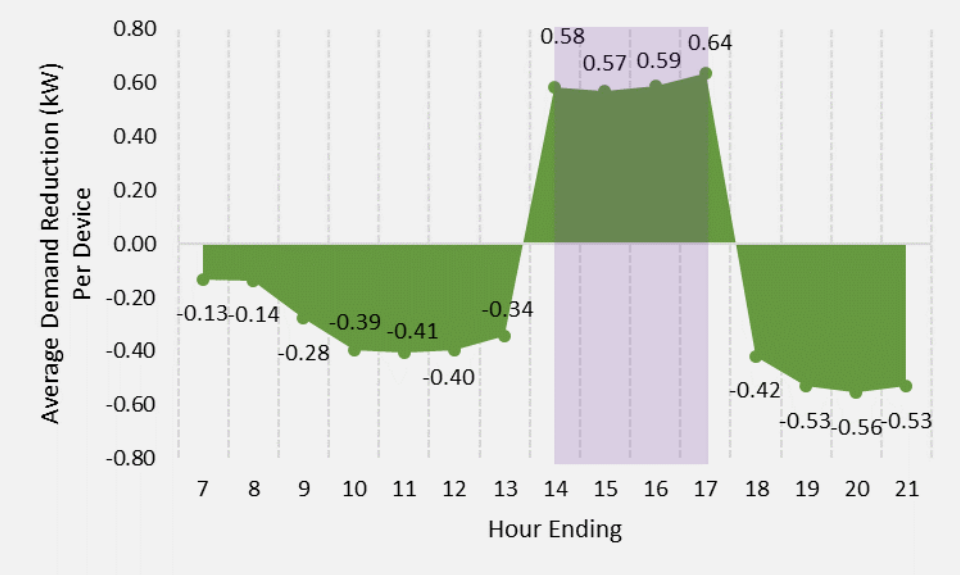


Figure 15. L+G Switch Demand Reduction from 2020 Demand Response Program Event 3

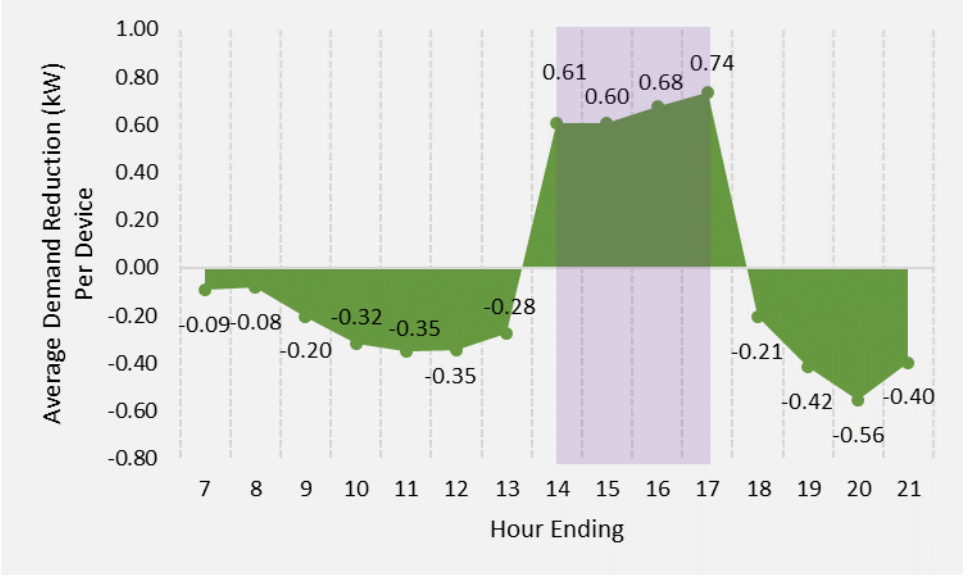


Figure 16. L+G Switch Demand Reduction from 2020 Demand Response Program Event 4

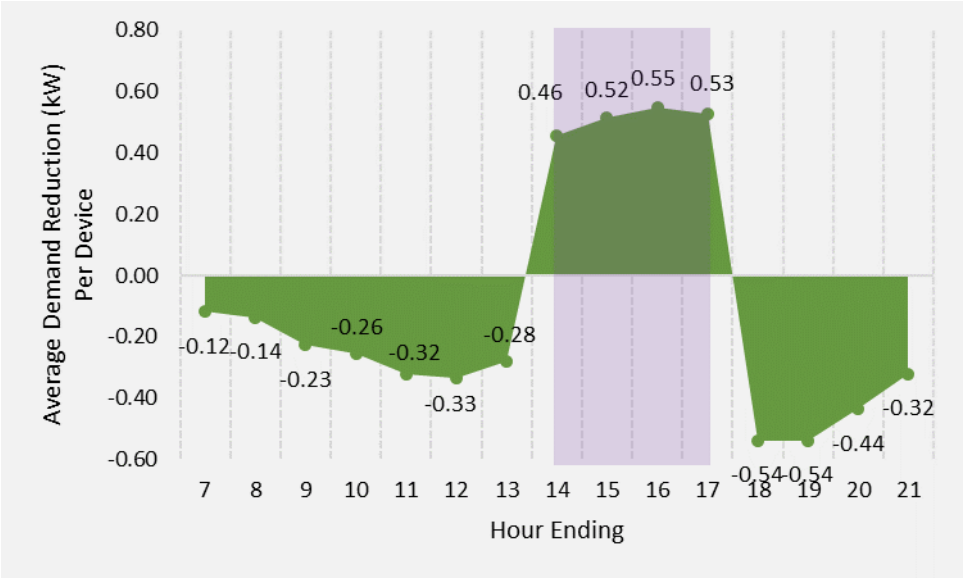


Figure 17. L+G Switch Demand Reduction from 2020 Demand Response Program Event 5

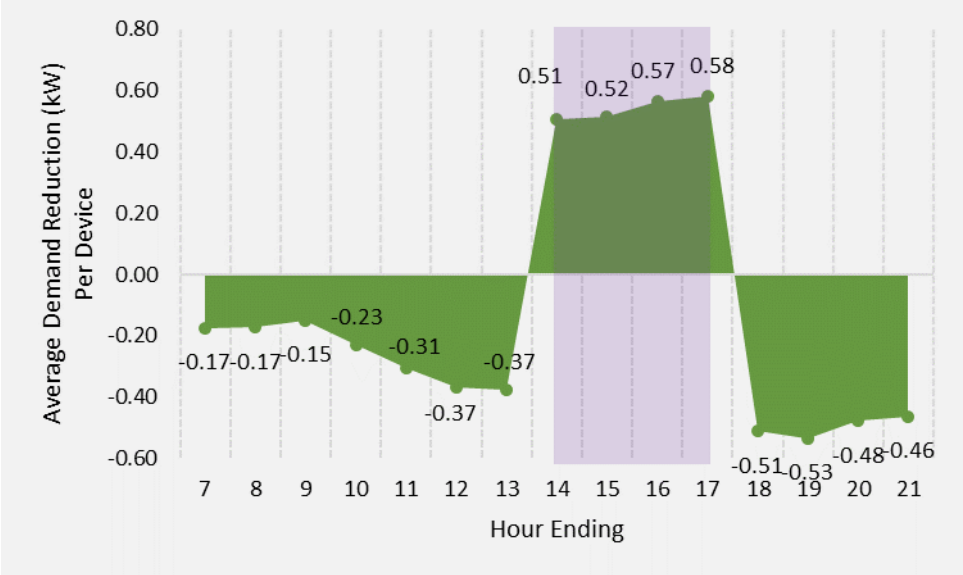


Figure 18. L+G Switch Demand Reduction from 2020 Demand Response Program Event 6

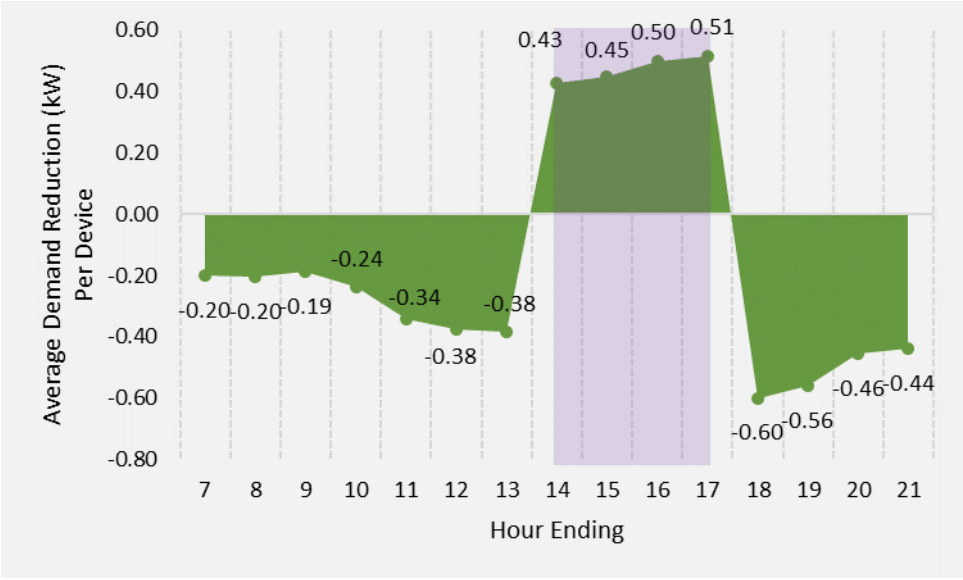


Figure 19 through Figure 24 show demand reduction from all six events for Nest thermostats. With the exception of Event 1, the performance of Nest thermostats followed a clear pattern during events—the highest demand reduction was consistently delivered in the first hour of the event, and reduction decreased sharply in the following hours as the event continued. This pattern reflects the Nest temperature setback strategy, which appears to deliver substantially larger initial demand reduction than the Cannon and L+G cycling strategies, but potentially lower savings during later event hours. This is logical, because the increased temperature setpoint when the event begins means that participating ACs may not need to run at all until the interior temperature reaches the new, higher setpoint later in the event.

Demand increased in the hour before each event: Nest thermostats automatically began to precool an hour before an event began to delay or offset any customer discomfort during the event, when the indoor temperature rose above the typical setpoints. As with L+G switches, the Nest results show that demand increased immediately following each event as setpoints returned to normal and participating ACs began cooling more than they would have during those hours if the event had not been called.

Figure 19. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 1

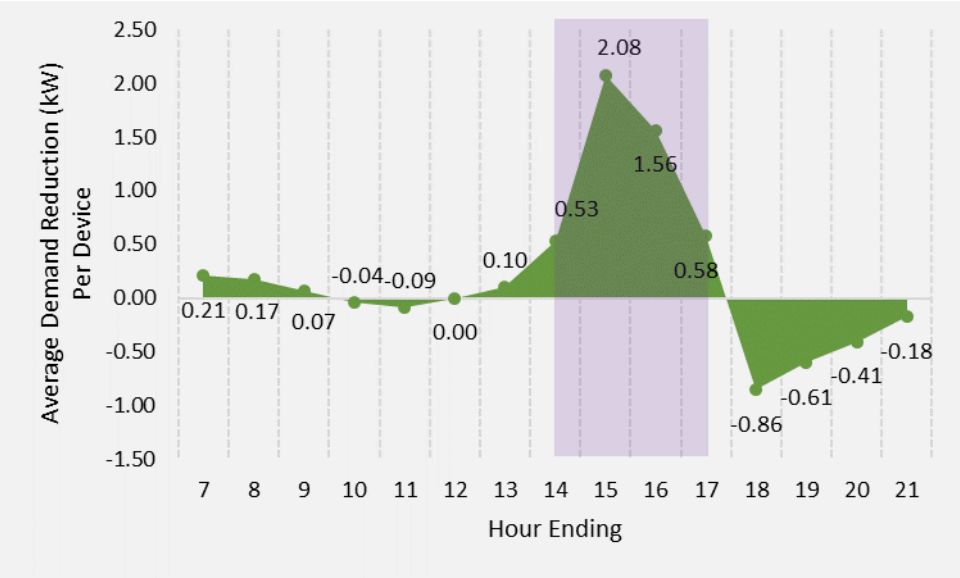


Figure 20. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 2

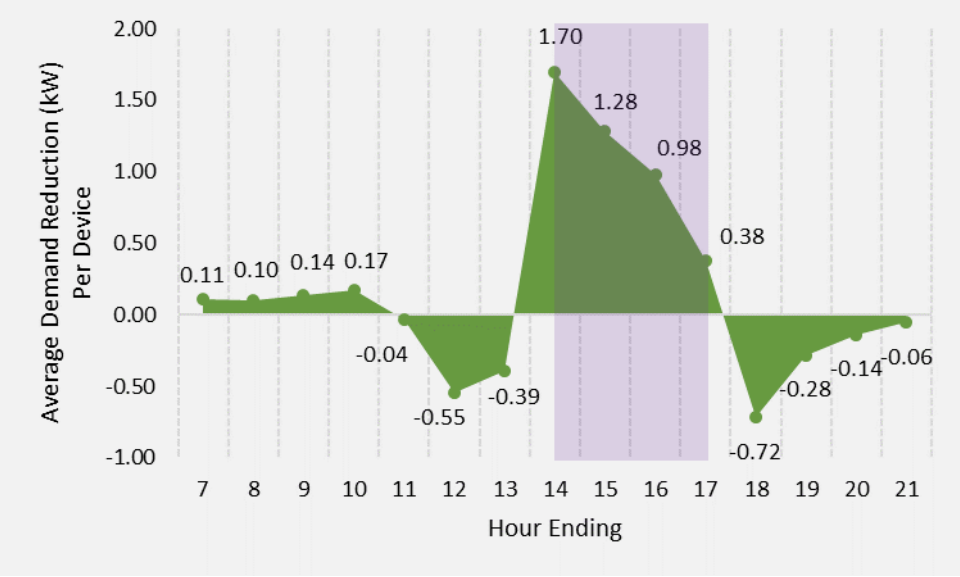


Figure 21. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 3

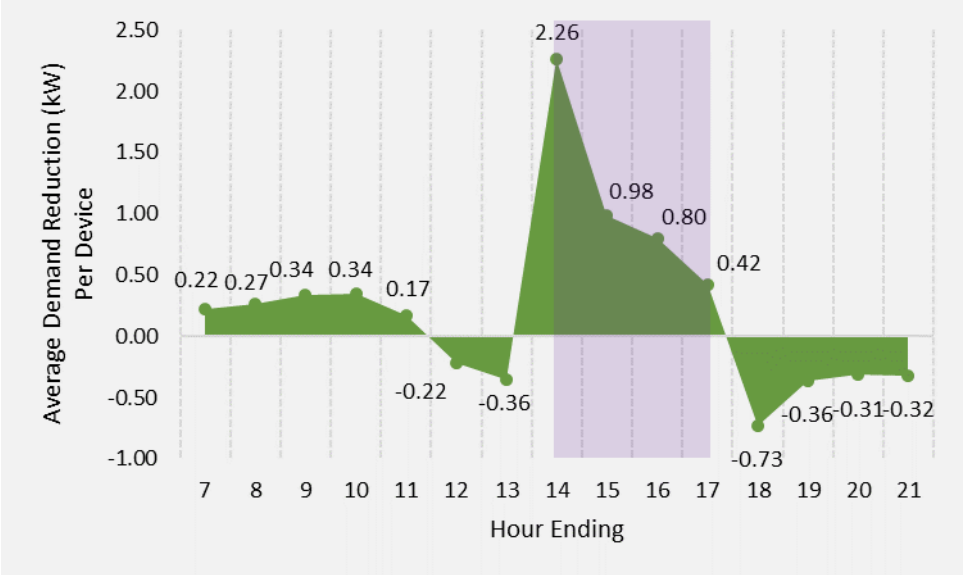


Figure 22. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 4

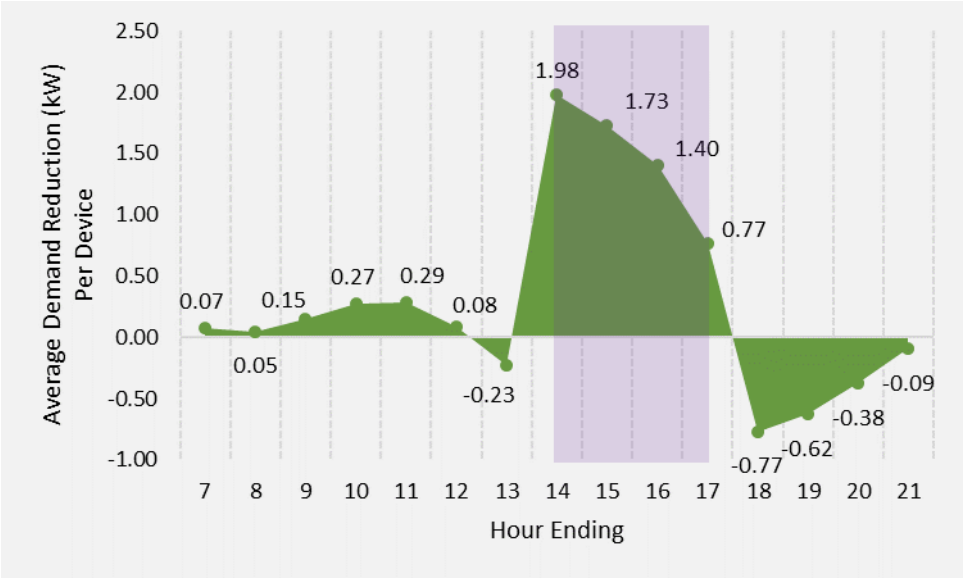


Figure 23. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 5

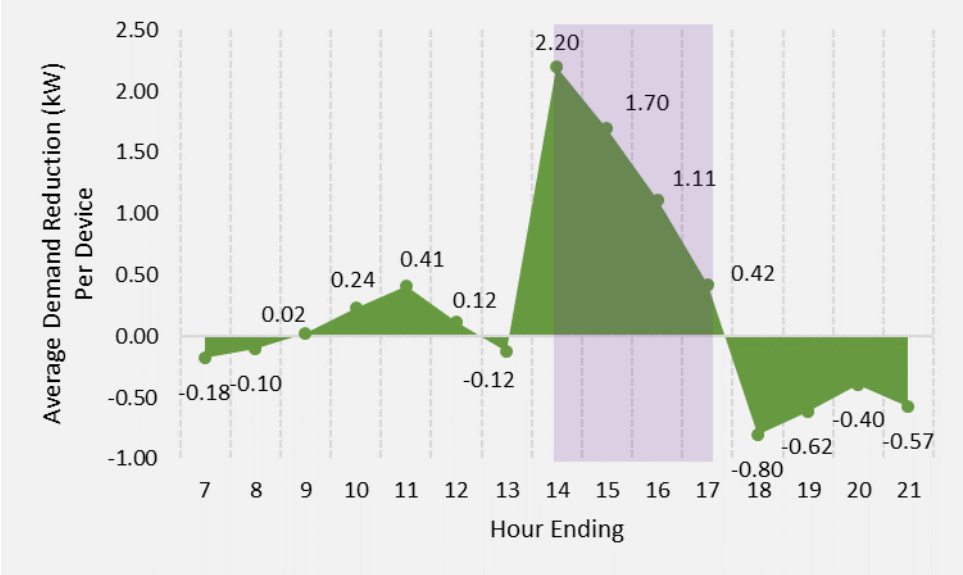


Figure 24. Nest Thermostat Demand Reduction from 2020 Demand Response Program Event 6

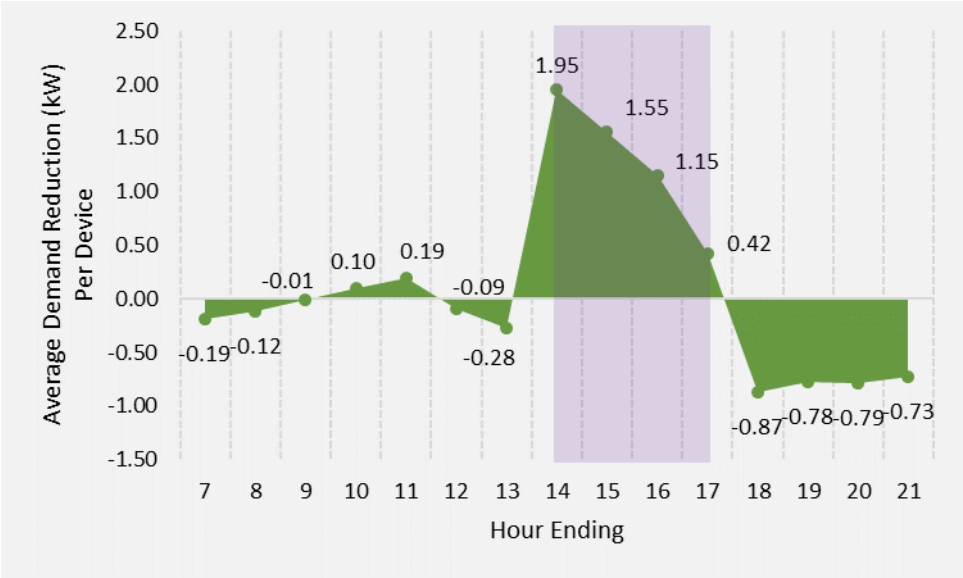


Figure 25 through Figure 30 show demand reduction from all six events for Ecobee thermostats. These figures do not show estimates for the hours from 6 p.m. to midnight because of a substantial amount of missing data. Like Nest thermostats, during events Ecobee thermostat had large first-hour demand reduction, which fell in subsequent hours, reflecting the temperature setback strategy employed by both Nest and Ecobee. Like Nest thermostats, the Ecobee thermostats automatically began to precool an hour before events began, resulting in demand increases between noon and 1 p.m. on most event days. With the exception of events 3 and 4, demand increased immediately following each event as setpoints returned to normal and participating ACs began cooling more than they would have during those hours if the event had not been called.

Note that the first-hour reductions from Ecobee thermostats are much smaller than those estimated from Nest thermostats. This difference may be due to different magnitudes or different timing of the temperature setbacks employed by each manufacturer, or could be due to more thermostat overrides during events by Ecobee participants. However, as shown in *Appendix D*, Ecobee thermostats also consistently recorded lower baseline (non-event day) AC runtimes (resulting in lower demand) than Nest thermostats. This lower baseline may reflect systematic differences in home size or AC performance between Nest and Ecobee participants, but more likely reflects bad runtime data from one or both manufacturers. Due to the unavailability of advanced metering infrastructure (AMI) or end-use logger data, the evaluation team cannot independently verify the validity of runtime data from any of the thermostat manufacturers.

Figure 25. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 1

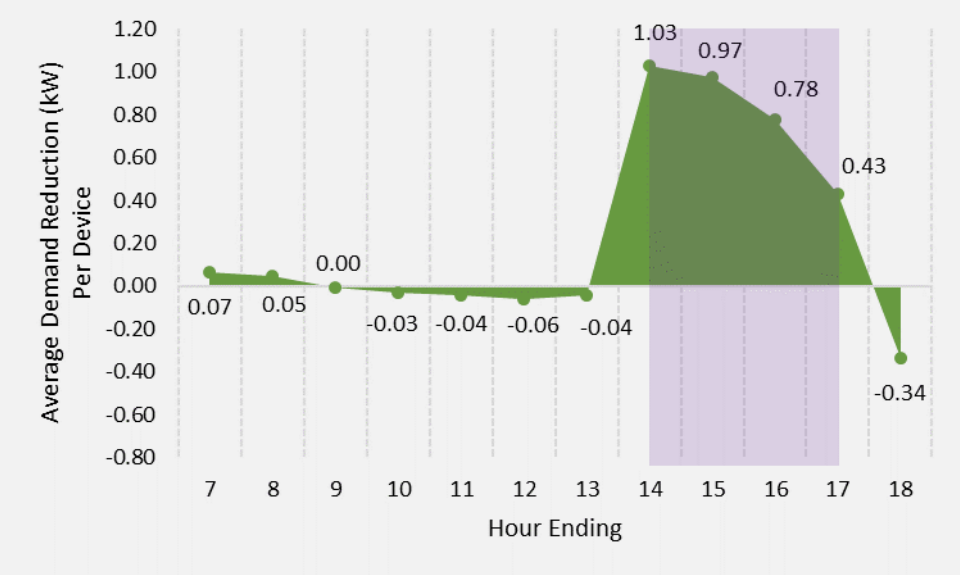


Figure 26. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 2

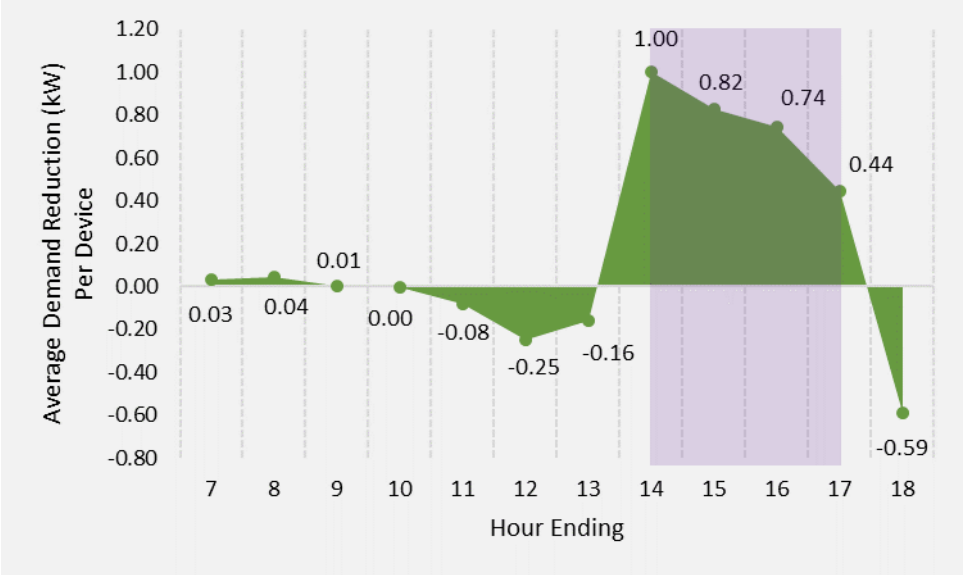


Figure 27. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 3

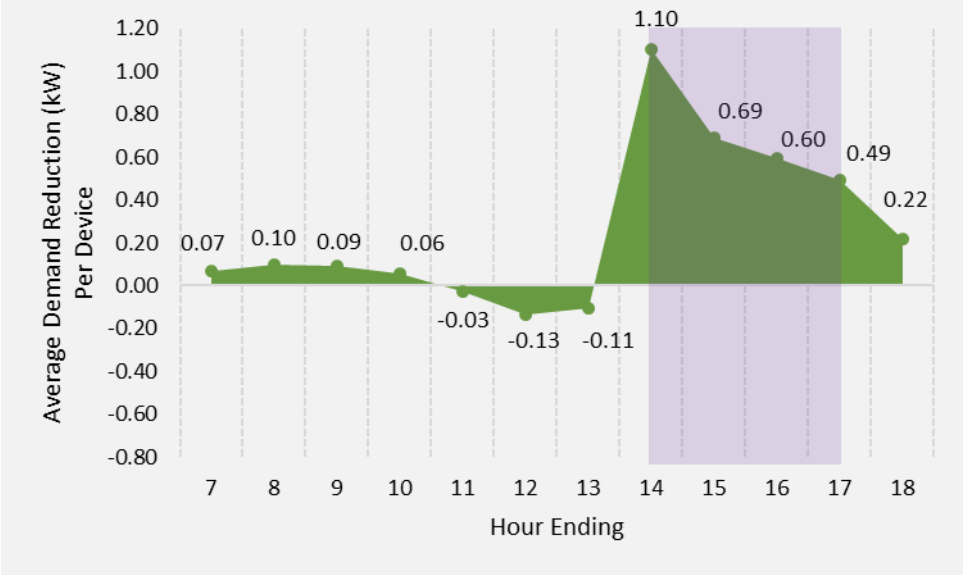


Figure 28. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 4

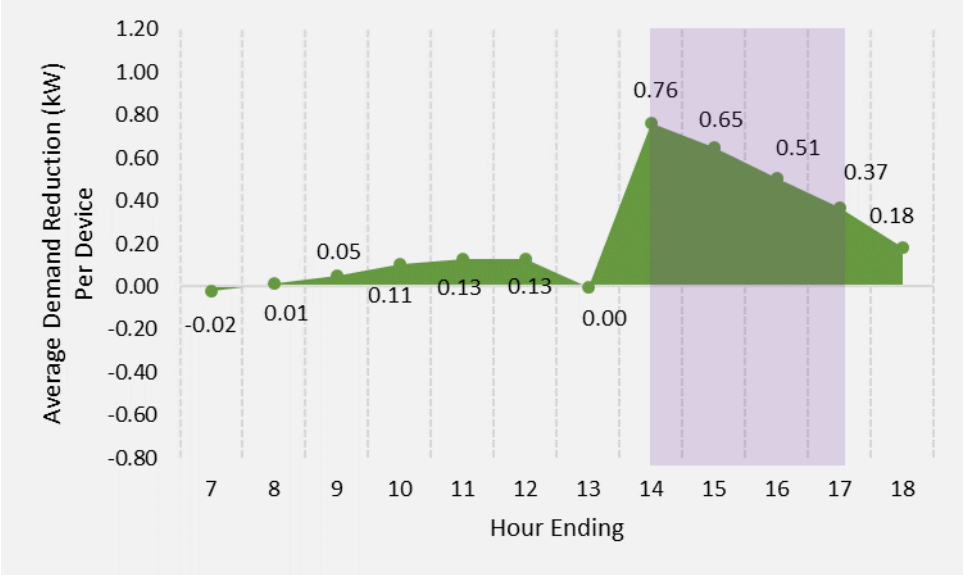


Figure 29. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 5

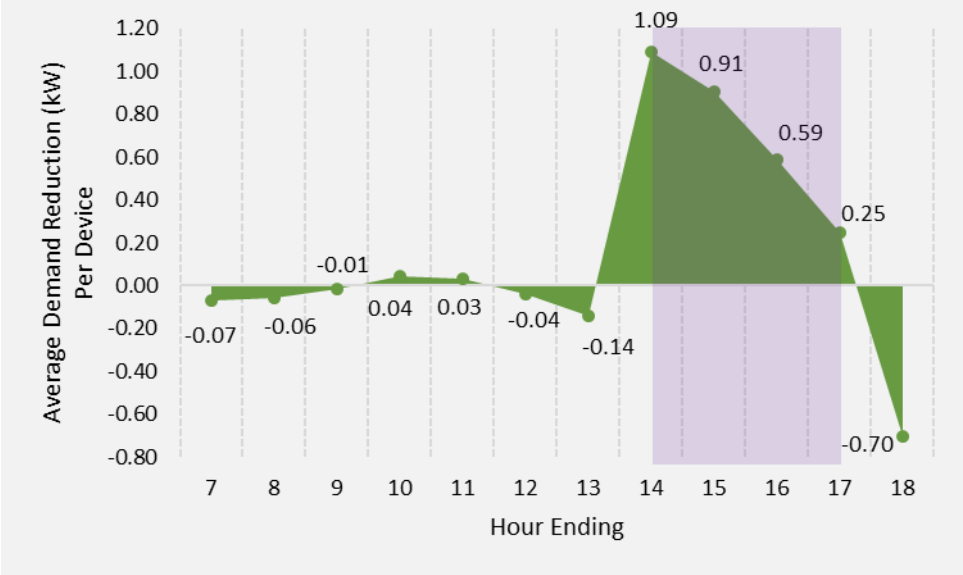
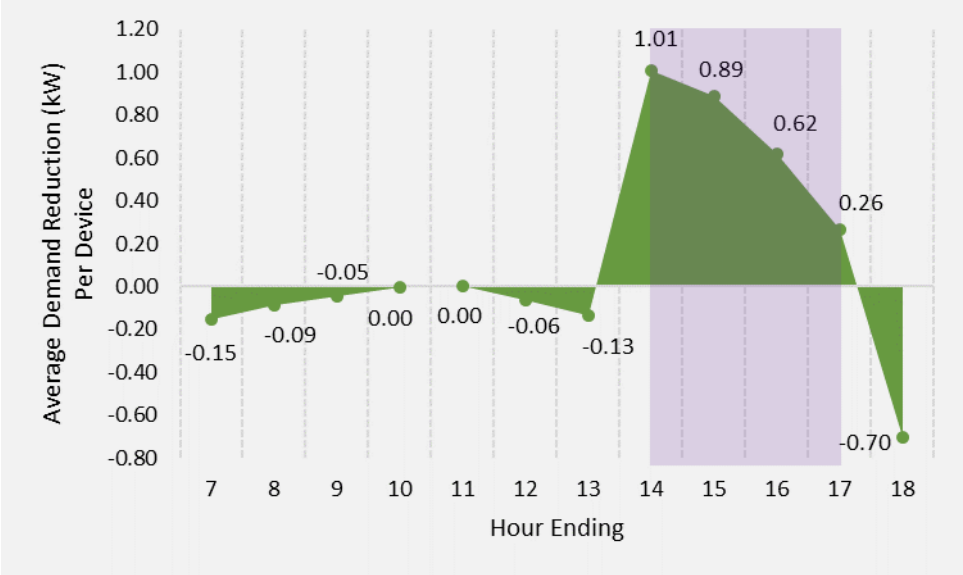


Figure 30. Ecobee Thermostat Demand Reduction from 2020 Demand Response Program Event 6



Nonparticipation Rates

Table 17 shows audited and verified quantities of enrolled residential devices, alongside participation rates, for each device and event (and Table 18 shows the same type of results for participating C&I devices). The evaluation team determined audited event participation by reviewing the program tracking data and removing devices that were unenrolled or not installed prior to each event. The team calculated verified quantities by multiplying audited quantities by the participation rate.

Cannon switches had the lowest participation rates (69%), determined by the proportion of sampled devices IPL found disconnected or missing during their verification study in 2020. Nest thermostats and L+G switches had the next lowest rates of participation (82% to 90%), determined by the number of devices with usable data during each event. Ecobee thermostats exhibited a high rate of participation—like with the L+G switches, the evaluation team verified Ecobee devices by the amount of usable logger data. The team did not receive sufficient Honeywell data to evaluate 2020 participation rates, and instead applied the participation rates from the 2019 evaluation.

Table 17. 2020 Demand Response Program Audited and Verified Quantities by Device (Residential)

Device	Event	Event Date	Audited Devices	Verified Devices	Participation Rate
Cannon Switch	1	July 1, 2020	36,824	25,564	69%
	2	July 7, 2020	36,823	25,563	69%
	3	July 8, 2020	36,823	25,563	69%
	4	July 15, 2020	36,823	25,563	69%
	5	August 25, 2020	36,823	25,563	69%
	6	August 26, 2020	36,823	25,563	69%
L+G Switch	1	July 1, 2020	5,468	4,585	84%
	2	July 7, 2020	5,468	4,615	84%
	3	July 8, 2020	5,468	4,597	84%
	4	July 15, 2020	5,468	4,534	83%
	5	August 25, 2020	5,464	4,535	83%
	6	August 26, 2020	5,464	4,522	83%
Nest Thermostat	1	July 1, 2020	6,021	4,943	82%
	2	July 7, 2020	6,021	4,999	83%
	3	July 8, 2020	6,021	5,002	83%
	4	July 15, 2020	6,021	4,973	83%
	5	August 25, 2020	6,009	5,424	90%
	6	August 26, 2020	6,009	5,437	90%
Ecobee Thermostat	1	July 1, 2020	7,490	7,311	98%
	2	July 7, 2020	7,490	7,315	98%
	3	July 8, 2020	7,490	7,315	98%
	4	July 15, 2020	7,490	7,315	98%
	5	August 25, 2020	7,487	7,448	99%
	6	August 26, 2020	7,487	7,448	99%
Honeywell Thermostat	1	July 1, 2020	194	190	98%
	2	July 7, 2020	194	190	98%
	3	July 8, 2020	194	190	98%
	4	July 15, 2020	194	190	98%
	5	August 25, 2020	194	190	98%
	6	August 26, 2020	194	190	98%

Table 18. 2020 Demand Response Program Audited and Verified Quantities by Device (Commercial)

Device	Event	Event Date	Audited Devices	Verified Devices	Participation Rate
Cannon Switch	1	July 1, 2020	261	181	69%
	2	July 7, 2020	261	181	69%
	3	July 8, 2020	261	181	69%
	4	July 15, 2020	261	181	69%
	5	August 25, 2020	261	181	69%
	6	August 26, 2020	261	181	69%
L+G Switch	1	July 1, 2020	141	118	84%
	2	July 7, 2020	141	119	84%
	3	July 8, 2020	141	119	84%
	4	July 15, 2020	141	117	83%
	5	August 25, 2020	141	117	83%
	6	August 26, 2020	141	117	83%

Ex Post Demand Response Impacts

Table 19 shows *ex ante*, audited, verified, and *ex post* net demand reduction for devices in the 2020 Demand Response program. IPL did not report *ex ante* or audited savings by device; therefore, the team estimated the distribution of total reported savings by assuming the same distribution as assumed for the audited devices. Overall, the evaluation team evaluated a 75% realization rate for residential customers and a 30% realization rate for C&I customers.

The participation rate, reflected in the difference between audited and verified savings, mainly drove the realization rates for residential customers. The rest of the discrepancies resulted from differences in *ex ante* and *ex post* per-unit savings estimates: average per-unit *ex post* estimates for Cannon and L+G switches and Honeywell thermostats (0.66, 0.41, and 0.51 kW, respectively) were both lower than the average per-unit *ex ante* savings (.71 kW.) Per-unit *ex post* savings for smart thermostats were much larger than for switches, but only contributed 38% of the overall demand reductions.

Similarly, participation rates for C&I customers drove a large portion of the C&I realization rate. The team applied the updated participation rate for Cannon devices (69%), which was lower than previous years. In addition, the team updated the impact scaling factors for commercial devices based upon the AC tonnages shown in the program tracking data, which resulted in lower per-unit impacts for commercial L+G switches than in previous years.

Table 19. Event-Based Demand Reduction Summary for All 2020 Demand Response Program Devices

Device	Sector	*Ex Ante* Savings (kW) [a]	Audited Savings (kW) [a]	Verified Savings (kW)	*Ex Post* Net Savings (kW)	Realization Rate
Cannon Switch	Residential		26,585	18,455	16,915	64%
	C&I		486	337	192	39%
	Total		**27,070**	**18,793**	**17,107**	**63%**
L+G Switch	Residential		3,947	3,296	1,854	47%
	C&I		262	219	40	15%
	Total		**4,209**	**3,515**	**1,895**	**45%**
Nest Thermostat	Residential		4,344	3,703	6,407	147%
	C&I		0	0	0	N/A
	Total		**4,344**	**3,703**	**6,407**	**147%**
Ecobee Thermostat	Residential		5,407	5,313	5,213	96%
	C&I		0	0	0	N/A
	Total		**5,407**	**5,313**	**5,213**	**96%**
Honeywell Thermostat	Residential		140	137	96	69%
	C&I		0	0	0	N/A
	Total		**140**	**137**	**96**	**69%**
Total	**Residential**	**40,449**	**40,422**	**30,904**	**30,485**	**75%**
	C&I	**778**	**748**	**556**	**232**	**30%**

[a] The evaluation team confirmed total *ex ante* and audited savings for the residential and C&I sectors but could not confirm *ex ante* or audited savings separately for each device type.

Smart Thermostat Event Opt-Outs

The evaluation team investigated the number of smart thermostat customers who participated in each event using Nest data provided by the manufacturer. CLEAResult also collected Ecobee data, but these did not include opt-out data for specific events. CLEAResult did not collect Honeywell data in 2020 due to the small number of enrolled devices and the costs associated with collecting these data. Table 20 summarizes these results. Across all six events, between 64% and 72% of customers participated for the entire duration of an event, while between 18% and 26% opted out by adjusting their thermostat's temperature setting or system mode (compared to between 11% and 14% of customers in 2019). The increase in Nest event opt-out rates in 2020 may be attributed to more participants working or spending time at home due to the COVID-19 pandemic.

Up to 1% of customers had turned their AC system off prior to or during an event, while another 4% to 5% may not have participated due to technical errors with the Nest demand response system. The percentage of customers who opted out during an event increased substantially between the first event and the last event, suggesting that Nest participants were more inclined to opt out with each additional demand response event during the summer.

Table 20. 2020 Demand Response Program Smart Thermostat Opt-Out Rates

Event Date	Missing Status	Completed Event	Participant Opted Out during Event	System Off during Event	Technical Error [a]
July 1, 2020	4.50%	72.08%	17.95%	0.25%	5.22%
July 7, 2020	4.64%	71.20%	19.58%	0.67%	3.91%
July 8, 2020	4.57%	71.11%	19.47%	0.88%	3.98%
July 15, 2020	4.86%	69.60%	19.69%	0.51%	5.34%
August 25, 2020	5.64%	64.64%	25.41%	0.58%	3.73%
August 26, 2020	5.45%	64.42%	25.62%	0.47%	4.04%

[a] Technical errors included cases when the thermostat did not receive an event signal, received the signal late, or was in the wrong schedule mode at the start of the event.

Ex Ante Demand Response Forecasted Impacts

The evaluation team estimated the demand reduction that IPL can expect from devices during future years by estimating savings under typical weather conditions, shown in Table 21. We created models that incorporated actual usage and weather conditions from 2020 events to predict future demand reduction as a function of weather. The team modeled *ex ante* results using normal weather assumptions for the Indianapolis area. IPL can expect each participating L+G switch to achieve approximately -0.29 kW and each smart thermostat to achieve between -0.59 kW and -0.32 kW.

Table 21. 2020 Demand Response Program *Ex Ante* Savings Per Device

Device	Per-Unit Demand Reduction (kW)	Relative Precision (90% Confidence)
L+G Switch	-0.29	±4.69%
Nest Thermostat	-0.59	±2.53%
Ecobee Thermostat	-0.35	±3.59%
Honeywell Thermostat	-0.32	±36%

The team's *ex ante* demand reduction estimates depend greatly on the six summer events in 2020 used to model savings. The model has a limited ability to predict load reduction under weather conditions outside the range observed during 2020 events. For example, the model may overpredict savings that would occur if an event were called on a cooler day in the summer, or it may underpredict the savings for an event on a very hot day. The 2020 program year was, on average, warmer than typical weather conditions, resulting in lower forecasted *ex ante* results.

Energy-Savings Impacts

By design, demand response programs are capacity based, with a primary goal of shifting load away from peak periods and toward periods of less demand. As a result, they do not necessarily yield energy savings. Snapback often reduces the energy savings associated with an event, so many utilities do not claim *ex ante* energy savings for cycling programs. However, annual smart thermostat energy savings and demand reduction exists from the direct-install portion of the program, where residential[13] customers who complete the Home Energy Assessment receive a free smart thermostat (when eligible). Annual thermostat savings are not based on participation in events and are separate and in addition to event-based demand reduction.

The evaluation team used the Indiana TRM (v2.2) estimation approach to calculate deemed per-measure smart thermostat savings of 649.03 kWh per year. According to program tracking data, IPL claimed419.192 kWh per year per measure, which the evaluation team used to calculate audited and verified savings. IPL reported *ex ante* savings for 13,705 smart thermostats, which the evaluation team used as the number of devices provided through the program and therefore eligible for energy savings.

Table 22 summarizes program *ex ante* reported savings, audited savings, verified savings, and *ex post* gross savings for smart thermostats. The residential devices achieved 605,027 kWh in *ex post* gross energy savings with a 120% realization rate. The evaluation team pro-rated annual per-measure savings by their installation and de-enrollment dates and the distribution of CDDs across the year. In contrast, IPL reported constant savings per measure, suggesting that any measures installed during the year received full annual savings—this was a main driver of the discrepancy between audited and verified savings.

[13] In reviewing the program tracking data, the team found that there were no smart thermostats enrolled in the commercial Demand Response program. The team concluded that the free smart thermostat offer was available only to residential Demand Response participants, and therefore that there were no energy savings associated with the commercial side of the program.

Table 22. 2020 Demand Response Program Smart Thermostat *Ex Ante* and *Ex Post* Gross Energy Savings (kWh)

Measure	*Ex Ante* Savings	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Smart Thermostats	503,030	2,113,237	390,771	605,027

Ex Post Net Energy Savings

As discussed in the *Energy-Savings Impact Estimation Methods* section, the evaluation team applied a NTG of 100%, consistent with the 2017, 2018, and 2019 analyses. Therefore, the Demand Response program achieved net energy savings of 605,027 kWh.

Process Evaluation

The evaluation team assessed the Demand Response program operations and processes through an interview with IPL program staff.

Program Design

IPL's *2018 Residential Energy Efficiency Programs Operating Plan*[14] listed several goals for the Demand Response program:

- Update IPL's existing infrastructure of one-way Cannon switches to two-way devices
- Grow IPL's relationship with the local HVAC community
- Maintain the existing one-way demand response fleet until the two-way conversion is complete
- Drive the adoption of smart thermostats in the IPL service territory
- Create a foundation for the next-generation Demand Response program
- Leverage synergies between complementary IPL energy efficiency and demand response programs

Program Incentives

Incentives did not change from 2018 levels. Residential and business participants received a $5.00 per-month, per-unit credit on their electric bills from June to September, for a total of $20.00 per program season, per unit. Residential customers who connected their smart thermostat to a new or existing Demand Response account became eligible for a $50 rebate in addition to the $20 electric bill credit.

In 2020, IPL also visited a randomly selected sample of homes with Cannon loggers to document the number of operational, failed, and missing Cannon switches. At each site IPL determined whether the

[14] CLEAResult. Last updated 2017. *Residential Energy Efficiency Programs: Lighting & Appliance, Whole Home, Income Qualified, MultiFamily, Demand Response, Food Bank Programs 2018 Operating Plan.* Provided to Indianapolis Power & Light Company. https://cadmus.sharepoint.com/sites/CP6001/Shared%20Documents/6001%20IPL%202018-2020/Admin%20Docs/Programs/IPL%202018%20Residential%20Operating%20Plan%20Final_07082018.pdf?csf=1&e=CS5Mj2&cid=12a35ce0-4ecc-48ab-8878-35a02433c039

Cannon switch was connected, disconnected, or missing. Using IPL's site visit data, the evaluation team calculated that 69% of the Cannon switches were connected and 31% were disconnected or missing. For customers whose Cannon switch was nonoperational or missing, IPL discontinued the annual $20 electric bill credit.

Program Devices and Enrollment

Customers enrolled in the program through one of four avenues:

- ***Bring your own thermostat.*** Customers enrolled with their previously owned smart thermostat or with a smart thermostat they received through the Lighting and Appliance program (for a $50 rebate). Customers who purchased an Ecobee or Nest thermostat from the IPL Marketplace received another $50 at checkout when they enrolled in the Demand Response program, for a total of $100. This option was not available for Honeywell thermostats.
- ***eScore Home Energy Assessment.*** Customers enrolled with a free Nest or Ecobee thermostat they received during a Home Energy Assessment (through the Whole Home or IQW program). Prior to the COVID-19 pandemic, a program representative would install the thermostat for customers. In response to the COVID-19 pandemic, IPL switched the program design and began to provide virtual assessments and to ship thermostats to customers who were interested. Whole Home eScore customers received a free thermostat if they signed up for the Demand Response program; otherwise they had a $50 co-pay. Customers received a higher eScore if they enrolled in the Demand Response program. IQW customers did not receive a $50 incentive after receiving a thermostat through eScore, since they received the thermostat for free.
- ***Direct enrollment in the Demand Response program through IPL's website.*** Customers who wanted a free thermostat had to complete a free eScore Home Energy Assessment, otherwise they had to pay a $50 co-pay (or received a free L+G switch instead of the thermostat).
- ***Direct ship smart thermostats***. In response to the COVID-19 pandemic, IPL added direct shipping for smart thermostats to the IQW program in June 2020. CLEAResult worked with Ecobee to have these smart thermostats directly shipped to customers and pre-enrolled in the Demand Response program. The IQW program claims energy savings associated with the thermostat installation and the Demand Response program claims savings for event-based demand reductions.

Customers who had enrolled in the Demand Response program with a switch device in prior years could also upgrade their program device to a smart thermostat. In 2020, Google required all customers who owned a Nest device to sign a new terms of agreement; customers who did not sign this agreement were automatically unenrolled from the Demand Response program. CLEAResult conducted a strong outreach campaign via emails and mailers to encourage customers to sign the terms and re-enroll in the program. Nest also sent push notifications through devices so customers would sign the agreement and enroll. IPL's program manager estimated that as a result of this change, the program lost about 1,000 Nest devices. Though the number of verified Ecobee and Honeywell devices increased by 709% and 180%, respectively (from the last event in 2019 to the first event in 2020), the number of Nest devices fell by 6%, or 293 fewer devices.

Program Marketing and Outreach

CLEAResult handled most of the Demand Response program marketing, primarily through direct mail and targeted emails. IPL also cross-promoted the Demand Response program through Peer Comparison program home energy reports, the Whole Home and Income Qualified Weatherization (IQW) programs' eScore Home Energy Assessments, and the IPL Marketplace. IPL did not market the program to commercial customers in 2020, though it updated some commercial customer devices from Cannon to L+G switches.

For the first time in 2020, CLEAResult emailed all smart thermostat customers prior to the event season to remind them that events could occur and to explain how events affect their home's temperature and how participating in events helps IPL. CLEAResult took this step to reduce customer opt-out rates during demand response events. However, the evaluation team cannot determine the effectiveness of that email in reducing customer opt-out rates, which may have been compounded in 2020 since more customers stayed at home during the workday due to the COVID-19 pandemic (compared to 2019).

Demand Response Event Processes and Opt-Out Rates

IPL only schedules program curtailments on non-holiday weekdays, limited to four hours per day per participant (up from three hours in 2019). All smart thermostat participants receive an alert from the thermostat manufacturer on their thermostat and on their phone app one hour prior to an event occurring, but Cannon and L+G switch customers do not receive advance notice about events. Smart thermostat customers also receive notice once an event starts. Program participants may override any event by opting out in the thermostat mobile app or contacting the call center (for switches). IPL did not set a customer participation goal for 2020 program events.

Across all six events in 2020, between 18% and 26% of Nest participants opted-out by adjusting their thermostat's temperature setting or system mode (compared to between 11% and 14% in 2019). The percentage of customers who opted out during an event increased substantially between the first event and the last event, suggesting that Nest participants were more inclined to opt out with each additional demand response event during the summer.

The evaluation team does not have access to the opt-out data for Ecobee or Honeywell devices.

Program Delivery

For 2018 through 2020, IPL contracted with CLEAResult to implement the Demand Response program. CLEAResult handled program marketing, customer service, participant enrollment, direct installation of demand response devices, quality control audits and services for demand response devices, and maintenance of participant databases for demand response devices. IPL program staff monitored the program budget, ensured that CLEAResult followed its contractual responsibilities, coordinated marketing efforts with CLEAResult, decided when to call program events, and managed the implementation of AutoGrid, the demand response software platform. AutoGrid hosted all active enrolled demand responses on one platform, which called events and created reports.

The program experienced several problems with AutoGrid in 2020, the second year that IPL used this software to call demand response events. IPL found it challenging to load data to AutoGrid, which would allow for monitoring events in real time. Additionally, the evaluation team faced significant delays in receiving program data for the 2020 evaluation, due in part to the AutoGrid contract expiring.

Future Program Changes

IPL plans to make several changes to the program in 2021:

- IPL will switch implementers from CLEAResult to Uplight, with CLEAResult acting as a subcontractor to install L+G switches
- IPL will switch the demand response platform from Auto Grid to Orchestrated Energy (an Uplight product)
- IPL will add residential water heaters to the program as a demand response device (where qualified contractors install Aquanta switches with cell service onto existing water heaters, and these switches connect to the Orchestrated Energy platform)
- Pending approval by the Indiana Utility Regulatory Commission, IPL will also add electric vehicles (EVs) to the program so it can throttle or stop EV charging for 30 minutes during times of peak demand

Follow-Up on 2019 Evaluation Recommendations

The evaluation team discussed program status with IPL to follow up on the recommendations made during the 2019 evaluation. Table 23 shows the status for each of these.

Table 23. Demand Response Program 2019 Recommendation Status

2019 Recommendation	Status
Consider ceasing to offer the $50 Demand Response enrollment rebate for IPL Marketplace Nest customers until the Nest device is pre-authorized.	***Not completed.*** Nest began pre-authorizing all its devices in mid-2020, making this recommendation moot.
Upon enrollment and at the beginning of each demand response season, send an email to let program participants know they should expect to receive event notifications on a few hot days in the summer and that adjusting their thermostat during these events will opt them out of those events. Explain the benefits of the program to customers in terms of the bill credit and how participation in the event helps IPL to maintain affordable, reliable service for its customers.	***Completed.*** CLEAResult emailed all smart thermostat customers prior to the event season to remind them that evets could occur and to explain how events affect their home's temperature and how participating in events helps IPL.
In lieu of a $5 bill credit for program participation each month, provide a $20 bill credit to customers who participate for the entirety of at least one Demand Response program event.	***Not completed.*** IPL did not complete this suggestion since it would require a change in the program tariff.

Conclusions and Recommendations

CONCLUSION 1: Though 2020 per-device results are within range of previous estimates, unexplained differences in the magnitudes of the estimated demand reductions between device types, such as Nest and Ecobee, which resulted from limitations in the program design and the available data, motivated IPL to change the program implementation to improve evaluation accuracy.

One major obstacle in evaluating IPL's Demand Response program is that it is not implemented as a randomized control trial. In such a trial, a randomly selected portion of the participating customers are withheld from participating in demand response events. These customers serve as a control group, and their energy use serves as a baseline against which to compare the treatment group (which receives the event signals as usual) to estimate the demand reduction from each event. Randomized control trials are considered the gold standard in demand response program evaluation because using the randomly selected control group as a baseline reduces bias in the estimated event impacts. Without a control group, the evaluation must use AC consumption on non-event days to predict demand reduction during events, which increases the sensitivity of the results to changes in model specification and to unobserved factors specific to event hours.

Another major obstacle to evaluating this program is the availability and quality of data. Cannon switch data has not been collected since 2017 because these devices do not have two-way communication capability. Honeywell thermostat data collection proved too costly and time consuming to provide to the evaluation in 2020. Though data were available from Nest and Ecobee in 2020, the use of runtime data to estimate demand reduction relies on assumptions about the capacity and efficiency level of participating ACs to scale the results. In addition, the evaluation team noted large differences in average AC runtimes between Nest, Honeywell, and Ecobee devices. Some of that difference may be attributable to differences in customer and housing characteristics between the three groups, but more likely indicate errors in runtime data from one or more manufacturer.

Rolling out AMI data to IPL's Demand Response program participants, and collecting these hourly interval data during the summer, would solve data availability and quality issues. By using whole-home AMI interval data to estimate demand reduction, the evaluation team would not require in-person collection of Cannon switch data and would not need to rely on unverifiable runtime data from thermostat manufacturers. In addition, whole-home AMI data would provide an estimate of the total demand reduction of each participating household, not just from AC.

RECOMMENDATIONS

Leverage AMI data for the evaluation.

Where AMI data is not available, consider conducting a Cannon and smart thermostat logger verification study for 2021 to collect AC usage data from Cannon devices and verify the runtimes reported by smart thermostats. This will provide the program the most accurate impact estimates going forward.

For purposes of the evaluation, implement the program as a randomized controlled trial.

Coordinate with Uplight to streamline tracking data.

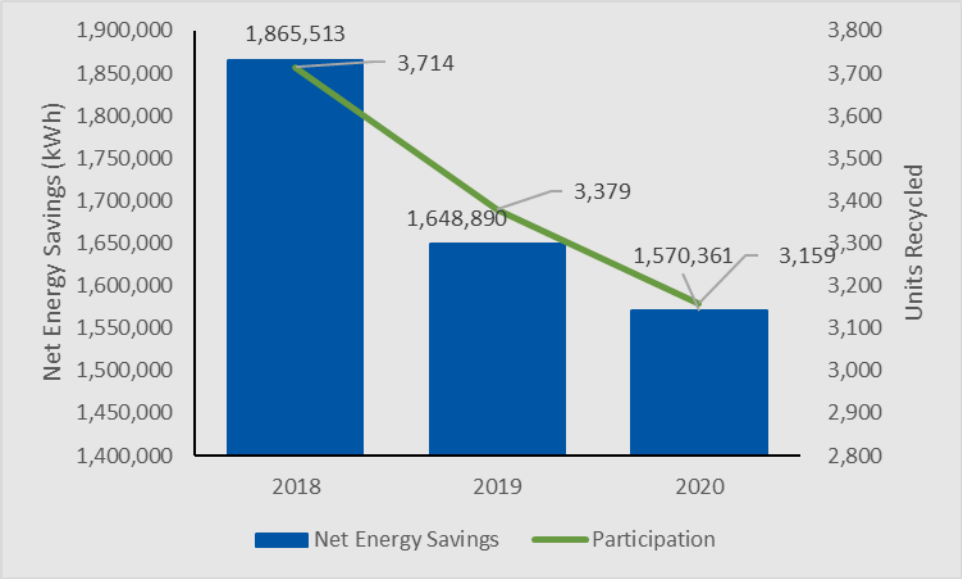
CONCLUSION 2: The 2020 program's demand reduction levels were likely suppressed by the COVID-19 pandemic and the automatic unenrollment of customers who did not sign new terms of agreement for their Nest device.

Across all six events in 2020, between 18% and 26% of Nest participants opted out, compared to between 11% and 14% in 2019. The percentage of customers who opted out during an event increased substantially with each additional event during the summer. The increased number of customers staying at home during the workday during the 2020 COVID-19 pandemic likely led to the increased opt-out rate despite IPL's educational email to enrolled customer prior to the start of the event season. Additionally, in 2020, Google required all customers who own a Nest device to sign a new terms of agreement, and all customers who did not sign the agreement were automatically unenrolled from the Demand Response program. Though the number of verified Ecobee and Honeywell devices increased by 709% and 180%, respectively (from the last event in 2019 to the first event in 2020), the number of Nest devices fell by 6%, with 293 fewer devices, despite outreach efforts from CLEAResult to encourage customers to sign the new terms of agreement with Google.

Appliance Recycling Program

Through the ARP, IPL collects and recycles functioning primary and secondary refrigerators and freezers. Customers who recycle a refrigerator or freezer can also recycle room air conditioners (room ACs) and dehumidifiers and receive a kit with three LEDs. In 2020, the program met 72% of its participation goals yet fell short of its energy savings and demand reduction goals, meeting 46% and 44% of its targets, respectively. In 2020, *ex post* net savings and *ex post* demand reductions are less than the net goals primarily due to net goals being based on a 98% program level NTG, while the evaluation team estimated energy savings and demand reduction NTGs for the 2020 program year of 53% and 55%, respectively. Figure 31 shows the program's energy savings and participation from 2018 to 2020.

Figure 31. Appliance Recycling Program Energy Savings and Participation by Year



Sources: Indianapolis Power & Light Company. Year-End DSM Scorecards for 2018, 2019, and 2020; Cadmus. Demand-Side Management Evaluation Report for 2018, 2019

Program Description

IPL offers this program to its residential customers to reduce energy consumption and ultimately to reduce energy load on the grid by removing appliances from service. ARCA, the program implementer, removes appliances from customer residences and disposes of the materials in an environmentally friendly manner—including recycling parts to the extent practical—at no cost to the customer. IPL increased its participation and savings goal for 2020 and added dehumidifiers as a qualifying measure. Based on high demand for the program in Indianapolis, ARCA can easily ramp program marketing up or down to meet savings goals.

IPL offers three types of ARP incentives and measures:

- A $50 incentive per refrigerator or freezer (up to two units per household, per calendar year); to qualify, the appliance must be in working condition, must be empty at the time of pick-up, and must be between 10 cubic feet and 30 cubic feet (from September to November, IPL offered a promotional incentive increase to $75; otherwise, incentive levels did not change from 2019 to 2020)
- A $20 incentive per room AC or dehumidifier (collected only from customers who recycle a refrigerator or freezer)
- One free LED kit (with three 9-watt LED bulbs) for participants who are present at the time of the appliance pick-up; customers may decline to receive the kit

In response to the COVID-19 pandemic, IPL paused the program in mid-March and resumed it in late May, changing the program model from in-home pick-up to curbside pick-up.

Research Objectives

To evaluate the 2020 IPL ARP, the evaluation team conducted both process and impact research activities. Through these activities, the team sought to address three research objectives:

- Assess customer satisfaction levels with the program overall
- Identify ways IPL can improve the program
- Calculate program savings, including updating ISRs for appliances and updating NTG values for refrigerators, freezers and LEDs

Research Approach

To answer the research objectives outlined above, the evaluation team conducted several activities:

- Interviewed IPL and ARCA program staff
- Conducted a survey of 2020 participants
- Reviewed the program tracking database to determine the audited measure quantity
- Applied verification and installation rates for recycled appliances, given the respective audited measure quantities per 2020 participant survey results
- Applied installation rates from Illinois TRM (v8) to verified LED measure quantities
- Determined the savings associated with light bulbs distributed in previous program years and installed in 2020
- Calculated *ex post* gross per-measure savings for recycled appliances and distributed LEDs using algorithms and variable assumptions from the Indiana TRM (v2.2), Illinois TRM (v8), and the UMP
- Applied measure-specific NTGs to develop *ex post* net savings from *ex post* gross savings, using 2020 participant survey results

Program Performance

IPL originally forecasted to recycle 4,400 appliances (refrigerators, freezers, room ACs and dehumidifiers) through the program in 2020. At the end of 2020, IPL reported that the program had met 72% of its appliance quantity forecast (3,159 appliances) while spending 73% of the budget. IPL did not include the free LED distributions in its appliance quantity, but savings associated with the LEDs are included in the total program savings. As Table 24 shows, the program achieved 1,570,361 kWh of *ex post* net energy savings and 247 kW of *ex post* net demand reductions, which represented 46% of the energy-savings goal and 44% of the demand reduction goal. *Ex post* net savings and *ex post* demand reductions are less than the net goals primarily due to net goals being based on a 98% program level NTG, while the evaluation team estimated energy savings and demand reduction NTGs of 53% and 55%, respectively.

Table 24. 2020 Appliance Recycling Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	3,400,864	1,570,361	46%
Demand Reduction (kW)	561	247	44%
Participation (Appliances Recycled)	4,400	3,159	72%
Budget	$899,613	$660,835	73%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

Table 25 shows a summary of the evaluated savings (audited, verified, *ex post* gross, and *ex post* net) for the 2020 program. The evaluation team observed alignment between the reported *ex ante* savings and the tracking database savings. Verified results were produced by accounting for installation rates and carryover savings associated with light bulbs distributed in the current program year that get installed in a future program year. Carryover savings are included in verified, *ex post* gross, and *ex post* net savings. The evaluation team determined *ex post* gross savings by modeling expected savings, then determined *ex post* net savings by accounting for NTG.

Table 25. 2020 Appliance Recycling Program Savings Summary (with Carryover)

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	2,467,044	2,467,044	2,391,644	2,960,755	1,570,361
Demand Reduction (kW)	404	404	398	452	247

To develop *ex post* net savings from *ex post* gross results, the team applied measure-specific NTGs, presented in the *Ex Post Net* Savings section. Table 26 shows program-level metrics. Realization rates are a measure of the ratio between evaluated *ex post* gross savings and reported *ex ante* savings. Program realization rates exceeded 100%, primarily due to differences between *ex ante* and *ex post* refrigerator and freezer assumptions. The NTG of 53% for energy savings varies slightly from the NTG of 55% for demand reduction because the team calculated NTG as a weighted value of measure-level impacts; room ACs and dehumidifiers account for a higher proportion of total demand reduction than total energy savings, leading to a higher NTG for demand reduction.

Table 26. 2020 Appliance Recycling Program Realization Rates and Net-to-Gross Summary

Gross Realization Rates		Freeridership [a]		Spillover		NTG [a]	
Energy Savings (kWh)	Demand Reduction (kW)	kWh	kW	kWh	kW	kWh	kW
120%	112%	47%	45%	0%	0%	53%	55%

[a] The evaluation team determined the program-wide freeridership and NTG estimates as the weighted average (by *ex post* gross) of each respective measure-level rate.

Impact Evaluation

This section outlines steps the evaluation team followed to establish *ex post* gross and net energy savings and demand reduction (*Appendix E* outlines these steps in further detail). These key steps were necessary for developing audited and verified measure quantities, verifying *ex ante* deemed savings, and calculating *ex post* deemed savings per measure and *ex post* gross and *ex post* net savings per measure and for the program overall.

Audited Savings

The evaluation team reviewed the program tracking database to verify reported quantities and made no adjustments to the *ex ante* measure quantity (Table 27). As a result, the total audited savings equaled the *ex ante* savings.

Table 27. 2020 Appliance Recycling Program Audited Quantities and Savings

Measure	Unit of Measure	Audited Quantity	*Ex Ante* Per-Unit Savings		Audited Savings	
			kWh	kW	kWh	kW
Refrigerator	Refrigerators	2,587	765.09	0.130	1,979,288	336.310
Freezer	Freezers	455	543.22	0.090	247,165	40.950
Room Air Conditioner	Room ACs	78	226.78	0.160	17,689	12.480
Dehumidifier	Dehumidifier	39	1,000.00	0.000	39,000	0.000
9-Watt LED – Three Pack	Kit of Three Bulbs	2,838	64.80	0.005	183,902	14.190
Total		**5,997**	**--**	**--**	**2,467,044**	**403.930**

Note: Values rounded for reporting purposes.

Verified Savings

The verified quantity equals the number of measures, by measure type, that IPL can use to claim program energy savings and demand reduction. To develop verified quantities, the evaluation team applied verification and installation rates for recycled appliances and LEDs, given each measure's respective audited measure quantities. The team included future carryover savings from LED bulbs distributed in 2020 as part of the total verified measure quantity.

Verification and Installation Rates

Table 28 summarizes installation rates the team applied in the 2020 evaluation based on an online survey conducted with 2020 participants in January and February 2021. The survey allowed the team to measure participant recall rates of recycled appliances. Survey results indicated installation rates of 100% for refrigerators, freezers, room ACs, and dehumidifiers.

Table 28. 2020 Appliance Recycling Program Installation Rates by Product Type

Product Type	Installation Rate
Refrigerator	100%
Freezer	100%
Room Air Conditioner	100%
Dehumidifier	100%
9-Watt LED – Three Pack	59%

Carryover Bulbs

After applying the first-year installation rate, the evaluation team calculated carryover savings from bulbs that were not installed in the first program year (2020), but were anticipated to be installed in 2021 or 2022 using the methodology specified in the UMP for claiming savings from carryover for residential lighting programs. These calculations account for bulbs in storage being installed in future program years. Table 29 shows the calculated ISR and total number of carryover bulbs that we estimate will be installed in future program years.

Table 29. Quantity of Appliance Recycling Program Carryover Bulbs Installed after 2020

Program Year	Measure	Percentage of Stored Bulbs Installed after 2020	Total Bulbs Installed after 2020
2020	9-Watt LED	18%	1,500

Overall Verified Measure Quantity

The evaluation team calculated verified measure quantities by applying verification and installation rates (shown in Table 28) to the audited *ex ante* quantity. The team established a program total of verified measures—1,500 carryover bulbs (reported in Table 30 as 500 equivalent LED-three pack kits) and 4,833 verified program measures—as shown in Table 30.

Table 30. 2020 Appliance Recycling Program Verified Quantities

Measure	Unit of Measure	*Ex Ante* Audited Quantity	Installation Rate	Verified Quantity
Refrigerator	Refrigerators	2,587	100%	2,587
Freezer	Freezers	455	100%	455
Room Air Conditioner	Room ACs	78	100%	78
Dehumidifier	Dehumidifier	39	100%	39
9-Watt LED – Three Pack	Kit	2,838	59%	1,674
Subtotal		**5,997**	**N/A**	**4,833**
LED Carryover				
9-Watt LED	Bulbs	N/A	N/A	500
Program Total		**5,997**	**N/A**	**5,333**

Note: Values rounded for reporting purposes.

Per-Unit Verified Savings

As part of the database review, the evaluation team verified that the *ex ante* deemed savings values ARCA provided were applied correctly and appeared consistent with overall reported savings. However, the *ex ante* deemed savings values for LED measures included embedded installation rates. Because the team applied installation rates to verified measure quantities, we did not apply installation rates as part of *ex ante* deemed savings (which would reduce savings twice).

To establish verified savings without doubling the installation rates, the evaluation team removed embedded installation rates from *ex ante* deemed savings values. Table 31 shows the resulting *ex ante* deemed savings values with and without embedded installation rates.

Table 31. 2020 Appliance Recycling Program *Ex Ante* Savings Per Unit

Measure	*Ex Ante* Savings (with Embedded Installation Rates)		Program Assumed Installation Rate	*Ex Ante* Savings (without Embedded Installation Rates)	
	kWh	kW		kWh	kW
Refrigerator	765.09	0.13	100%	765.09	0.13
Freezer	543.22	0.09	100%	543.22	0.09
Room Air Conditioner	226.78	0.16	100%	226.78	0.16
Dehumidifier	1,000.00	0.00	100%	1,000.00	0.00
9-Watt LED – Three Pack [a]	64.80	0.01	75%	86.39	0.01

Note: Values rounded for reporting purposes.

[a] The evaluation team calculated the assumed installation rate for this measure from the ratio of program tracking savings and Indiana TRM (v2.2) savings value for three LED bulbs.

Ex Post Gross Savings

The evaluation team calculated *ex post* gross per-measure savings for program measures using algorithms and variable assumptions from the UMP (refrigerator and freezer recycling), the Indiana TRM (v2.2) (LEDs; room AC recycling), and the Mid-Atlantic TRM (dehumidifier recycling). The UMP models for refrigerator and freezer savings calculations contain the same variables as those used in the

Indiana TRM (v2.2), but model appliance recycling data from six different utilities for the refrigerator model and from three different utilities for the freezer model. *Ex ante* refrigerator and freezer savings differed from *ex post* gross savings because *ex ante* savings were based off 2015 IPL ARP verified savings. *Appendix E* presents the algorithms, variable assumptions, and specific references for all program measure *ex post* calculations. It also contains detailed descriptions that explain the differences between *ex ante* and *ex post* savings.

Table 32 shows a comparison of *ex ante* deemed savings per measure (without embedded installation rates) and *ex post* gross savings per measure. By summarizing realization rates by measure, the table shows savings variations between *ex ante* and *ex post* gross savings. The primary driver for these differences are the changes in characteristics between the appliances recycled in 2015 that inform the *ex ante* savings and the appliances recycled in 2020 as reported in the ARCA tracking data. For refrigerators, the share of primary units increased from 19% in 2015 to 53% in 2020, which increased the average per-unit kilowatt-hour usage. Refrigerators also saw a corresponding decrease in the percentage of units kept in unconditioned spaces (which is expected if the share of primary units increases). This led to an increase in annual kilowatt-hours because of a smaller interaction between heating degree days (HDDs) and the share of units in unconditioned spaces (appliances used in conditioned spaces use more electricity to maintain cooler temperatures than units exposed to cold winter temperatures in unconditioned spaces).

Table 32. 2020 Appliance Recycling Program *Ex Ante* and *Ex Post* Gross Energy Savings and Demand Reduction

Measure	*Ex Ante* Savings (without Installation Rates)		*Ex Post* Gross Savings		Realization Rate (*Ex Post Gross* / *Ex Ante*)	
	kWh	kW	kWh	kW	kWh	kW
Refrigerator	765.09	0.13	955.70	0.14	125%	109%
Freezer	543.22	0.09	575.83	0.09	106%	95%
Room Air Conditioner	226.78	0.16	226.78	0.20	100%	128%
Dehumidifier	1,000.00	0.00	533.60	0.12	53%	-
9-Watt LED – Three Pack	86.39	0.01 [a]	86.39	0.01 [b]	100%	178%

Note: Values rounded for reporting purposes.

[a] True value is 0.0067.

[b] True value is 0.0118.

Table 33 and Table 34 show program *ex ante* reported savings, audited savings, verified savings, and *ex post* gross savings for each measure. Prior to including lighting carryover savings, the program achieved 2,917,554 kWh in *ex post* gross energy savings and 446.17 kW in *ex post* gross demand reduction. Carryover savings added 43,201 kWh to program energy savings and 5.92 kW to program demand reduction, accounting for 1% of the overall program energy savings and demand reduction. Including carryover savings, the ARP's *ex post* contributions are 2,960,755 kWh in energy savings with a 120% gross realization rate, and 452.09 kW in demand reduction with a 112% gross realization rate.

Table 33. 2020 Appliance Recycling Program *Ex Ante* and *Ex Post* Gross Electric Energy Savings (kWh)

Measure	*Ex Ante* Deemed Savings [a]	*Ex Ante* Savings	Audited Gross Savings	Verified Gross Savings [b]	*Ex Post* Per-Measure Savings	*Ex Post* Gross Savings
Refrigerator	765.09	1,979,288	1,979,288	1,979,288	955.70	2,472,396
Freezer	543.22	247,165	247,165	247,165	575.83	262,003
Room Air Conditioner	226.78	17,689	17,689	17,689	226.78	17,689
Dehumidifier	1,000.00	39,000	39,000	39,000	533.60	20,810
9-Watt LED – Three Pack	64.80	183,902	183,902	108,802	86.39	144,656
Subtotal	**N/A**	**2,467,044**	**2,467,0444**	**2,391,644**	**N/A**	**2,917,554**
Carryover Measures						
9-Watt LED	N/A	N/A	N/A	N/A	N/A	43,201
Program Total	**N/A**	**2,467,044**	**2,467,044**	**2,391,644**	**N/A**	**2,960,755**
Total Program Realization Rate (*Ex Post* Gross / *Ex Ante*)						**120%**

Note: Values rounded for reporting purposes.

[a] *Ex ante* deemed savings include embedded *ex ante* installation rates. Multiplying this number by the verified measure quantity does not result in verified gross savings.

[b] Verified gross savings equal the verified measure quantity multiplied by *ex ante* savings (with installation rates removed). Refer to Table 32 for *ex ante* savings values (with removed installation rates).

Table 34. 2020 Appliance Recycling Program *Ex Ante* and *Ex Post* Peak Demand Reduction (kW)

Measure	*Ex Ante* Deemed Reduction [a]	*Ex Ante* Reduction	Audited Gross Reduction	Verified Gross Reduction [b]	*Ex Post* Per-Measure Reduction	*Ex Post* Gross Reduction
Refrigerator	0.13	336.31	336.31	336.31	0.142	366.78
Freezer	0.09	40.95	40.95	40.95	0.085	38.87
Room Air Conditioner	0.16	12.48	12.48	12.48	0.205	15.98
Dehumidifier	0.00	0.00	0.00	0.00	0.121	4.72
9-Watt LED – Three Pack	0.00 [c]	14.19	14.19	8.37	0.012	19.82
Subtotal	**N/A**	**403.93**	**403.93**	**398.11**	**N/A**	**446.17**
Carryover Measures						
9-Watt LED	N/A	N/A	N/A	N/A	N/A	5.92
Program Total	**N/A**	**403.93**	**403.93**	**398.11**	**N/A**	**452.09**
Total Program Realization Rate (*Ex Post* Gross / *Ex Ante*)						**112%**

Note: Values rounded for reporting purposes.

[a] *Ex ante* deemed savings include embedded *ex ante* installation rates. Multiplying this number by the verified measure quantity does not result in verified gross savings.

[b] Verified gross savings equal the verified measure quantity multiplied by *ex ante* savings (with installation rates removed). Refer to Table 32 for *ex ante* savings values (with removed installation rates).

[C] True value is 0.0049.

Ex Post Net Savings

To calculate net savings, the evaluation team applied refrigerator, freezer, and LED NTGs estimated as part of the 2020 evaluation. These NTG estimates were based on self-reported responses to questions related to what the customer would have done with their appliance absent the program. We calculated

NTGs by removing freeridership and secondary market impact values (these savings would have happened in the program's absence) from gross savings. Greater details of the NTG methodology are provided in *Appendix B*.

The evaluation team followed UMP methodology recommendations to exclude participant spillover in adjusted net savings. We excluded spillover from the analysis for several reasons:

- Unlike other programs, the ARP does not include energy education and is not likely to induce or identify energy efficiency opportunities.
- There are a limited number of measures recycled in the ARP, limiting the opportunities for similar types of spillover. It may be less likely that recycling in exchange for an incentive would induce the spillover of dissimilar or costly measures.

Table 35 shows that measure-level NTGs for the 2020 ARP ranged. Refrigerator freeridership was 30% (at ±20% relative precision) with 19% secondary market impacts, while freezer freeridership was 19% (at ±23% relative precision) with 21% secondary market impacts. The team assumed freeridership for room ACs and dehumidifiers as 0%, since we did not stratify the survey for this information in 2020 (both measures represent less than 1% of overall program savings and the units cannot be recycled through the program without recycling a qualifying refrigerator or freezer).

Table 35. 2020 Appliance Recycling Program Net-to-Gross Summary

Measure	Freeridership	Secondary Market Impacts	NTG
Refrigerator	30%	19%	51%
Freezer	19%	21%	60%
Room Air Conditioner	0%	N/A	100%
Dehumidifier	0%	N/A	100%
9-Watt LED – Three Pack	45%	N/A	55%

The evaluation team applied the NTGs from Table 35 to *ex post* gross savings (shown in Table 33 and Table 34). Table 36 and Table 37 show resulting *ex post* net energy savings and demand reduction for 2020. The program contributed 1,570,361 kWh and 246.78 kW in *ex post* net energy savings and *ex post* net demand reduction (including carryover savings), respectively. The evaluation team calculated program total NTG values for both kilowatt-hours and kilowatts from the ratio of total *ex post* net savings to total *ex post* gross savings.

Table 36. 2020 Appliance Recycling Program *Ex Post* Net Savings

Measure	*Ex Post* Gross Savings (kWh)	NTG	*Ex Post* Net Savings (kWh)
Refrigerator	2,472,396	51%	1,270,456
Freezer	262,003	60%	158,084
Room Air Conditioner	17,689	100%	17,689
Dehumidifier	20,810	100%	20,810
9-Watt LED – Three Pack	144,656	55%	79,561
Subtotal	2,917,554	53%	1,546,600
LED Carryover 2017–2019			
9-Watt LED	43,201	55%	23,761
Program Total	**2,960,755**	**53%**	**1,570,361**

Note: Values rounded for reporting purposes.

Table 37. 2020 Appliance Recycling Program *Ex Post* Net Reduction

Measure	*Ex Post* Gross Reduction (kW)	NTG	*Ex Post* Net Reduction (kW)
Refrigerator	366.78	51%	188.47
Freezer	38.87	60%	23.45
Room Air Conditioner	15.98	100%	15.98
Dehumidifier	4.72	100%	4.72
9-Watt LED – Three Pack	19.82	55%	10.90
Subtotal	446.17	55%	243.53
LED Carryover 2017–2019			
9-Watt LED	5.92	55%	3.26
Program Total	**452.09**	**55%**	**246.78**

Note: Values rounded for reporting purposes.

Process Evaluation

For the process evaluation, the evaluation team interviewed IPL and ARCA program staff and reviewed program tracking data.

Program Delivery

IPL offers the ARP to residential customers who seek to recycle functioning primary or secondary appliances. IPL added dehumidifiers as a qualifying add-on program measure in 2020. IPL increased its participation and savings goal to 4,400 in 2020 (from 3,400 in 2019), to reflect that the program had met or exceeded forecast participation in prior years. ARCA conducts several tasks:

- Oversees program implementation
- Maintains a call center and online scheduling website
- Schedules appliance pick-ups
- Maintains the participant database
- Picks up and recycles appliances (disables units and safely disposes of toxic and ozone-destroying materials)
- Distributes free LEDs at pick-up locations
- Fulfills customer incentive payments

The customer enrollment and program delivery process remained essentially similar from 2018 to 2020. Customers enroll by calling ARCA's customer service center or by signing up online through IPL's website. ARCA staff then verify that program applications came from IPL customers and that each appliance meets program requirements (must be in working condition and must meet a cubic footage requirement). As part of the enrollment process, ARCA schedules a pick-up appointment and notifies customers of the pick-up date, along with details of the appliance pick-up requirements (ensuring that the appliance is plugged in and empty prior to pick-up).

Under the typical program model, ARCA offered in-home pick-up, which required the presence of the customer and a clear pathway for removing the appliance. In response to the COVID-19 pandemic, IPL paused program appliance collection in mid-March and resumed in late May, changing to a curbside pick-up model for collecting plugged-in appliances from outside of customer residences (potential locations included garages, patios, porches, or behind garages). The new program model requires that customers sign an authorization form that they place inside their appliance.

When appliance collections were paused, ARCA placed active requests on a waitlist and added new scheduling inquiries to that waitlist as they occurred. Once the program restarted, ARCA prioritized scheduling for customers on the waitlist.

ARCA has a program metric to pick each appliance up within 10 days of the initial request, and to offer weekend pick-up dates twice per month. The 2020 program tracking data shows that, on average, customers had their appliance picked up within 15 days of enrolling in the program, which included long scheduling wait times while ARCA paused pick-up operations. For enrollments in March through May 2020, which were most affected by the program pause, scheduling times reached 30 days, but before and after this time, ARCA achieved scheduling times of 12 days.

On the day of the customer's appointment, ARCA inspects and verifies that the appliance meets all eligibility requirements. ARCA then loads the unit onto a truck and permanently disables the appliance by removing its power cord, cutting gaskets on refrigerator or freezer doors so they will not shut properly, and destroying cold control units. ARCA then transports the appliance to its recycling facility and completely dismantles the unit. ARCA labels all recycled appliances with a unique bar code to track each unit from pick-up to transportation to a recycling center, and ultimately to destruction. Once the unit has been destroyed, ARCA processes and mails the incentive payment to the customer. IPL program staff and ARCA staff reported that customers typically received the incentive within three to four weeks of appliance pick-up, though the official program goal is for customers to receive their incentive within four to six weeks of appliance pick-up.

Despite the service interruption due to COVID-19, IPL and ARCA reported that the program operated smoothly in 2020 and had few customer complaints, except that scheduling took longer than usual on re-start, which led to a temporary burst of customer comments about scheduling issues and wait time during that period. IPL expects to return to offering in-person pick-up in 2021 (while retaining curbside pick-up service as requested) and expects to add a multifamily pilot and provide appliance turn-in events at participating retailers.

Program Marketing and Outreach

In order to achieve higher targets in 2020 and to make up for lost time following a two-month program pause, ARCA leaned more heavily on email for program marketing in 2020 than it had in previous years and included a promotional period offering higher incentives. By leveraging email, ARCA increased their ability to stay current in the changing context of COVID-19.

In 2020 ARCA sent four emails to the IPL customer base and reported that spikes in incoming pick-up orders aligned with the timing of the emails. ARCA sent two waves of targeted direct mail postcards to zip codes with older age groups and incomes of at least $50,000, who have previously had strong participation. As in prior years, other marketing tactics included Facebook posts and Google search and Pandora internet radio advertisements. A 2020 mass media campaign promoted all IPL programs via Google, television, and radio advertisements. In 2019, ARCA started a partnership with six Home Depot stores that advertise the program in their stores and train retail staff to enroll in-store customers using a database to verify customer program eligibility. The partnership continued in 2020, but ARCA prioritized other channels such as email due to COVID-19 public health directives that largely deterred shoppers from visiting brick-and-mortar settings.

IPL successfully offered a promotional incentive for the first time in 2020. Those who placed an order between September and November received a $75 incentive, instead of $50. Despite continuing to operate with curbside pick-up, ARCA experienced a record-high number of appliance pick-ups in October 2020, at 559 units (compared to 268 in October 2019). Customers recycled 3,159 appliances under the promotion.

ARCA tracks the effectiveness of program marketing through weekly reports on submitted orders in relation to marketing efforts. For email and Google, click-through rates provide one measure of effectiveness. ARCA also asks customers through its customer satisfaction survey (at the time of enrollment) how they learned about the program. ARCA leveraged email marketing more heavily in 2020 than it had in previous years, where 13% of 2020 customers learned of the program through email (compared to 3% in 2019). Although email marketing is low cost and reaches the broadest swath of eligible customers, based on ARCA's 2020 survey, customers most commonly learned of the program through utility bill inserts (23%), word of mouth (18%), IPL's website (14%), and direct mail (7%).

In terms of program cross-promotion, the three-pack LED kit that is given to ARP customers includes marketing of IPL's energy efficiency opportunities in general by encouraging customers to visit IPL's Ways to Save webpage. The online reports for the Whole Home and IQW programs market the ARP to participants, and the Peer Comparison program's home energy reports also cross-promote the ARP.

Participant Feedback

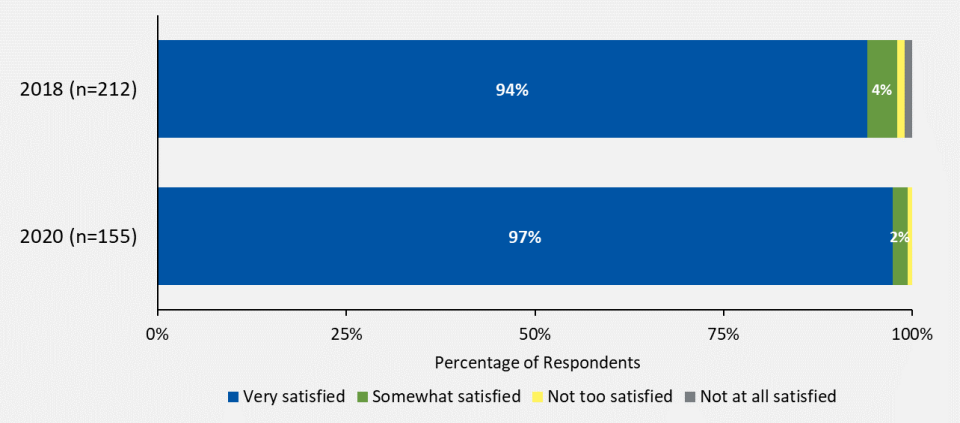
The evaluation team conducted an online survey with a sample of IPL customers who participated in the ARP in 2020. In addition to collecting details to inform the accuracy of measure quantities and calculation of NTG, the team designed the survey to determine customer satisfaction with and suggestions to improve the program.

The team sought to complete 140 surveys—70 with customers who had recycled refrigerators and 70 with customers who had recycled freezers through the ARP. As freezers represent a smaller quantity of participants, the team prioritized freezers in the sample (for customers who recycled both a refrigerator and freezer). The evaluation team emailed the survey to 611 customers, achieving 155 total survey responses (75 from refrigerator respondents and 80 from freezer respondents), for a 25% response rate.

Customer Satisfaction

Overall, customers had a very high level of satisfaction with the ARP. Nearly all customers were overall *very satisfied* (97%) with the program in 2020, as shown in Figure 32. This was very similar to the satisfaction level in 2018, the last time participants were surveyed, and there was little difference between those who had in-home versus curbside pick-up (100% and 97% *very satisfied*, respectively). In 2020, only one respondent reported being *not too satisfied* with their program experience, expressing frustration with having to call more than once to schedule the appliance pick-up. No respondents were *not at all satisfied*.

Figure 32. 2020 IPL Appliance Recycling Program Participant Program Satisfaction



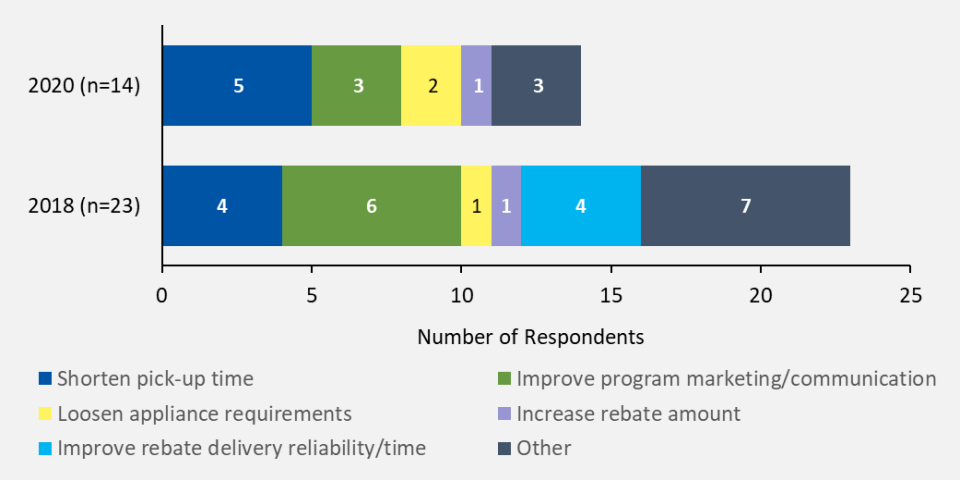
Source: 2020 IPL Appliance Recycling Program Survey Question F1. "How would you rate your overall satisfaction with the IPL Ditch Your Fridge program?"

Although nearly all respondents expressed high satisfaction with the ARP, 14 participants offered suggestions for program improvements in 2020. As shown in Figure 33, five participants suggested shortening the time between scheduling and pick-up, four of those who offered this suggestion had participated using curbside pick-up. Three respondents suggested improving program marketing and communication and two respondents suggested loosening appliance requirements, specifically the requirement that appliances are operational. Between the pick-up timing and loosened program requirements, two comments referred to the inconvenience of leaving appliances plugged in while outside:

- "I had to keep it running and the extension cord was in the way."
- "Pick up more quickly. Days sitting outside, plugged in! This did not thrill the neighbors or [help] my electric bill."

One respondent suggested increasing the rebate amount, and "Other" suggestions (from one respondent each) included offering bill credits for energy-efficient improvements, extending the time frame to cash the incentive check, and having random refrigerator parts left after pick-up. Compared to 2018, the 2020 survey received a lower proportion of comments about improving marketing and communication and no comments about improving rebate delivery or time to receive the rebate, but there was a slightly larger proportion of suggestions in 2020 to shorten the time between scheduling and pick-up.

Figure 33. 2020 IPL Appliance Recycling Program Participant Suggestions for Improvement



Source: 2020 IPL Appliance Recycling Program Survey Question F2. "What, if anything, could IPL do to improve the Ditch Your Fridge program?"

Follow-Up on 2019 Evaluation Recommendations

The evaluation team gathered feedback from IPL and ARCA on the status of recommendations made during the 2019 evaluation. IPL's efforts to address those recommendations is shown in Table 38.

Table 38. Appliance Recycling Program 2019 Recommendation Status

2019 Recommendation	Status
Expand the zip codes ARCA uses in its targeted email campaigns. In case where these zip codes contain a higher percentage of renters than other zip codes, include a call to action in the marketing materials for customers to share the marketing material with their landlords.	***Not completed.*** IPL did not use targeted email campaigns in 2020.
Expand the number of retail stores that market the program through point-of-sale advertisements.	***Not completed.*** IPL was unable to complete this suggestion in 2020 due to COVID-19.
Cross-promote the ARP through the eScore Home Energy Assessments, which reach customers of all incomes.	***Completed.*** IPL included a Ditch Your Fridge promotion in the IQW program online report.

Conclusions and Recommendations

CONCLUSION 1: Despite an increased goal and two-month service disruption due to the COVID-19 pandemic, the ARP continued to experience high customer satisfaction and ARP achieved 93% of the prior year's participation.

In 2020, the IPL ARP faced increased participation targets and unexpectedly paused operations for two months between mid-March and late May 2020. To adapt to pandemic circumstances, ARCA maintained a waitlist during the interruption and pivoted the program operations from in-home pick-up to curbside pick-up once the program resumed operations. On re-start, ARCA prioritized waitlist customers. Even though scheduling times increased due to the need to prioritize those who were waitlisted, customers maintained a very high level of satisfaction with the ARP, including customers who had received curbside pick-up. The evaluation team expects that the ability to return to in-home pick-ups in 2021, along with adding retail turn-in events and a multifamily pilot, should bolster participation in 2021.

CONCLUSION 2: Promotional incentives and an emphasis on email marketing buffeted the ARP against the challenging circumstances of the pandemic.

ARCA offered its first-ever promotion in 2020. Offering a $75 incentive attracted enough participants that the program experienced a record-high number of monthly recycled units during the promotion. ARCA also successfully increased its use of email marketing in 2020; spikes in incoming pick-up orders corresponded to the timing of email releases and its customer survey demonstrated that email is a growing source of awareness. Efforts to cross-promote the program on the IPL website through online reports for the Whole Home and IQW programs and through the Peer Comparison program, reflected positively in customer awareness; IPL's website was one of the top ways that customers said they had learned about the program in 2020.

CONCLUSION 3: *Ex post* net savings and demand reductions were less than the net goals, primarily due to net goals being based on a 98% program-level NTG planning assumption, while the evaluation team estimated energy savings and demand reduction NTGs of 53% and 55%, respectively.

The 2020 net goals were based on a 98% program-level NTG, an increase from the 69% program-level NTG used to establish 2019 net goals. The 2019 evaluated NTGs for energy savings and demand reduction were 54% and 55%, respectively.

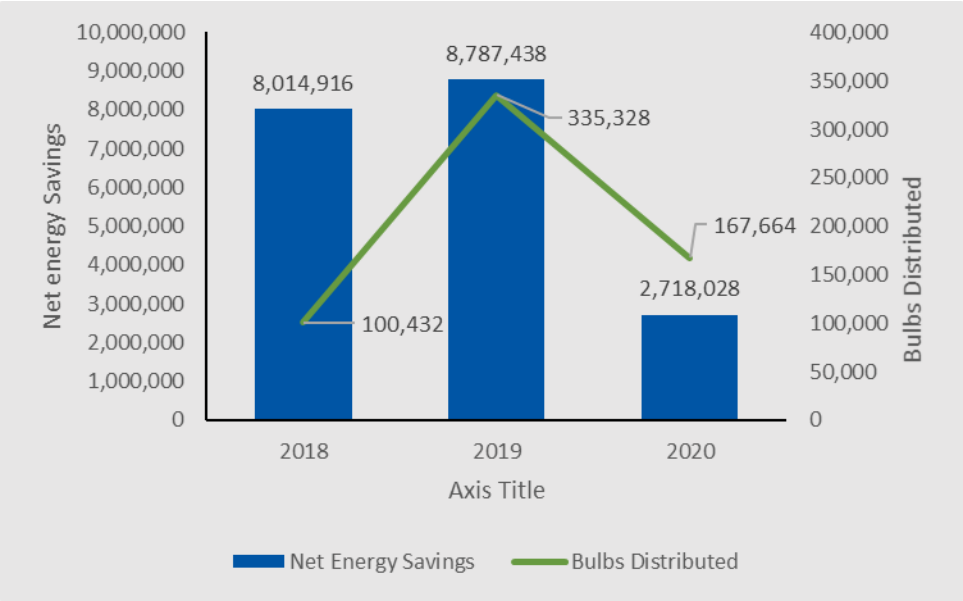
RECOMMENDATION

As planning cycles allow, update net savings goals to use the most current evaluated NTG values.

Community Based Lighting Program

Through the CBL program, IPL provides four-packs of ENERGY STAR–certified 9-watt LED bulbs to two food banks within its territory (Gleaners of Indiana and the Midwest Food Bank). The food banks use their network of local food pantries to distribute the bulbs within the local community. Over the last few years, the program has successfully reached customers who would not have otherwise purchased efficient lighting. Bulb recipients continued to express high satisfaction with the bulbs they received. In its third year, the program exceeded its savings goals, achieving 189% of its net energy savings goal and distributed its planned 167,664 LED bulbs. IPL claimed lower per-bulb savings in anticipation of the Energy Independence and Security Act of 2007 (EISA) backstop and thus a higher efficiency baseline. However, the backstop did not go into effect and the continued presence of halogen lamps in the market led the evaluation team to reference halogens as the baseline, yielding a high realization rate for the program. IPL's lower number of distributed bulbs in 2020 was due to an intentional decrease in promoting LEDs (Figure 34).

Figure 34. 2020 Community Based Lighting Program Bulb Distribution by Program Year



Sources: Indianapolis Power & Light Company. Year-End DSM Scorecards for 2018, 2019, and 2020; Cadmus. Demand-Side Management Evaluation Report for 2018, 2019

Program Description

After piloting the program concept in 2016 as part of the IQW program, IPL launched CBL as a stand-alone program in 2018. The CBL program enables income-qualified community members to save energy, increase their energy awareness, and produce long-lasting savings. By offering free energy-efficient LEDs to traditionally underserved and hard-to-reach markets, IPL helps its customers who may lack the means or awareness to participate in other residential energy efficiency programs.

The two participating food banks chosen at program launch continued to participate in 2020. CLEAResult worked with the food banks to establish a list of eligible pantries by zip code, which they cross-

referenced with IPL's service territory to determine the agencies that served the most IPL customers. In 2018 and 2019 the program included 79 food pantries, but only 43 pantries participated in 2020 due to COVID-19. During the pandemic, many food pantries received more customers than normal and could not accommodate the additional logistics of LED distribution.

The food banks primarily serve as distribution centers: they receive LEDs from the manufacturer quarterly, provide temporary storage, and distribute the allocated LED quantities to targeted food pantries. CLEAResult works with the food bank centers to verify LED bulb inventories and to set distribution quantities based on the size of food pantry client populations.

Research Objectives

The evaluation team sought to assess the achievement of program goals in its third year of operation and to provide feedback on potential program improvements for enhancing customer reach and satisfaction. The team identified several research objectives for the 2020 program year:

- Identify an installation rate for the distributed LEDs
- Determine energy savings and goal achievement
- Assess whether the program used appropriate savings algorithms
- Assess cross-promotion and customer awareness of other IPL programs, particularly the IQW program
- Assess customer and food pantry satisfaction with the program
- Identify program challenges and successes in 2020, as well as opportunities for improvement
- Assess whether food pantries are distributing the correct number of bulb packs to each person
- Assess the extent to which program LEDs are distributed to non-IPL customers (known as program leakage)

Research Approach

To address the research questions, the evaluation team conducted various activities:

- Interviewed IPL and CLEAResult program staff
- Reviewed LED bulb packaging and operations materials
- Surveyed program participants online
- Assessed reported savings against project documentation
- Examined whether claimed savings algorithms aligned with the Indiana TRM (v2.2) or other appropriate secondary sources

Program Performance

IPL distributed the planned 167,664 LED bulbs and achieved 2,718,028 kWh of net energy savings and 372 kW of demand reduction. While the program just met lamp sales goals, it dramatically exceeded its gross savings estimates. This is because IPL based its *ex ante* baseline watts assumption on the full implementation of the EISA. However, the 2020 backstop portion of that law was not brought into effect

by the Trump administration. As a result, IPL underestimated the 2020 baseline wattage, which the evaluation team based on survey responses from participants, which indicated that the program was still replacing large numbers of incandescent and halogen lamps, as well as a smaller number of efficient CFL and LED lamps. This weighted result was higher than the post-EISA assumed baseline, and, as a result, the program achieved 189% of its net energy savings goal. Table 39 and Table 40 show the program achievements.

Table 39. 2020 CBL Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	1,437,048	2,718,028	189%
Demand Reduction (kW)	168	372	222%
Participation (Bulbs)	167,664	167,664	100%
Budget	$490,687	$415,670	85%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

Table 40. 2020 CBL Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	1,437,118	1,437,118	1,359,014	2,718,028	2,718,028
Demand Reduction (kW)	197	197	186	372	372

Table 41 shows adjustment factors applied to *ex ante* gross savings and program realization rates. The high realization rate reflects the higher evaluated baseline wattage as compared to the planning assumptions.

Table 41. 2020 CBL Program Realization Rates and Net-to-Gross Summary

Realization Rate		Freeridership	Spillover	NTG
Energy Savings (kWh)	Demand Reduction (kW)			
189%	189%	0%	0%	100%

Impact Evaluation

For the impact evaluation of energy savings and demand reduction, the evaluation team followed a five-step process, in accordance with IPL's EM&V framework.

Ex Ante Savings

IPL reported 1,437,118 kWh of energy savings and 197 kW of demand reduction, based on a savings assumption of 8.6 kWh and 0.0012 kW per bulb.

Audited Savings

To determine the audited savings, the team compared the reported *ex ante* quantities against the quantities in the program tracking databases. The evaluation team also reviewed the tracking database and determined that it was accurate.

Inventory Verification

IPL and CLEAResult provided the evaluation team with detailed records of program bulbs distributed to the two participating food banks, Midwest and Gleaners. The evaluation team reviewed purchase order records between the manufacturer and the food banks and counts of the bulb packs received by the 43 food pantries in Indianapolis that received bulbs. The audited quantity matched those in the reported *ex ante* savings.

Tracking Database Analysis

The evaluation team reviewed the program tracking database to verify the completeness and accuracy of the information captured. The team found that inputs referenced for developing *ex ante* calculations of per-bulb savings did not match IPL's *2018 Residential Energy Efficiency Programs Operating Plan*, but were consistent with the assumed installation rate of 92% and baseline of 20 watt as outlined in the "Lighting and Appliances Measures, Assumptions, and Algorithms" appendix that noted an expected decrease in per-bulb savings beginning in 2020 based on a higher efficiency baseline. These inputs led to per-unit savings of 8.6 kWh and 0.0012 kW per bulb. Applying the per-unit savings assumptions totaled 1,437,118 kWh of energy savings and 197 kW of demand reduction.

Verified Savings

The evaluation team completed email surveys with bulb recipients continuously throughout 2020. Survey participants confirmed the total number of LED bulbs they received during their visits to food pantries in the prior year. Because CLEAResult intentionally does not collect program bulb recipient contact information and feedback at the distribution points, it included a survey URL on the postcards distributed with the LEDs. The evaluation team then administered the survey online.

Based on the responses, the evaluation team calculated a first-year installation rate of 75%, representing a decrease from the 2019 installation rate of 83%.[15] The first-year ISR for participants who reported receiving one four-pack was 90%, while the first-year ISR for those who reported any other quantity was 72%.

After applying the first-year installation rate, the evaluation team calculated carryover savings from bulbs that were not installed in the first program year (2018), but were anticipated to be installed in 2019 or 2020 as participants' lamps burned out. Using a method specified in Chapter 6 of the UMP,[16] the team calculated an adjusted lifetime ISR of 87%, accounting for discounted savings in future years. We

[15] For more details on how the team calculated first year and lifetime installation rates, please see *Appendix F*.

[16] "Chapter 6: Residential Lighting Evaluation." p. 7. http://www.nrel.gov/docs/fy17osti/68562.pdf

then applied this adjusted installation rate to per-unit *ex ante* savings to achieve verified savings (shown in Table 42).

Table 42. 2020 CBL Program Installation Rate by Product Type

Product Type	*Ex Ante* Installation Rate	Relative Precision (at 90% confidence)	Verified First-Year Installation Rate	Verified Lifetime Installation Rate	Relative Precision (at 90% confidence)
9-Watt LED	92%	±18.1%	75%	87%	±18.1%

The evaluation team replicated the deemed energy savings and demand reduction values for the 9-watt LEDs, without the 92% ISR applied, of 9.3 kWh and 0.0013 kW per bulb. IPL assumed and used a 92% installation rate, which resulted in reported and audited gross per-unit savings of 8.6 kWh and 0.0012 kW per bulb.

Table 43 shows the difference between *ex ante* and verified savings that reflects the difference in ISR and results in lower-than-expected verified savings for the program.

Table 43. 2020 CBL Program Verified Energy Savings and Demand Reduction

Product Type	Energy Savings (kWh)		Demand Reduction (kW)	
	Ex Ante	Verified	*Ex Ante*	Verified
9-Watt LED	1,437,118	1,359,014	197	186

Note: Values rounded for reporting purposes.

Ex Post Gross Savings

The evaluation team agrees with IPL's choice to use the UMP-directed savings calculations for 9-watt LEDs, as this is the most commonly accepted industry standard approach for calculating LED savings. However, the team determined that baseline savings should be driven by participating customer survey results from 2019 and 2020. Those results found that approximately 36% of program lamps were replacing already efficient alternatives, such as CFLs and other LEDs. To account for this phenomenon, the evaluation team applied a survey-weighted alternative baseline, using the share of responses for each lamp type, and the assumed baseline Watts for the program 9 Watt lamp, to develop a mixed lamp baseline that accurately reflects survey results. Combined results for both survey years are presented in Table 44.

Table 44. 2019-2020 Survey Based Lamp Baseline Approach

Baseline Lamp Type [a]	Responses (n)	Responses (%)	Assumed Baseline	Delta Watts
Incandescent	104	53%	60	51
Halogen	20	10%	43	34
CFL	26	13%	13	4
LED	45	23%	9	0
Total	**195**	**100%**	**31**	**22**

[a] To establish Delta Watts, the program distributed 9 Watt general service lamp LED consumption value was subtracted from the baseline lamp assumption for each lamp type.

After establishing baseline Watts, the evaluation team used the Indiana TRM specified savings algorithm to develop *Ex Post* measure savings. Table 45 and Table 46 show savings across the first four impact evaluation steps.

Table 45. 2020 CBL Program *Ex Ante* and *Ex Post* Gross Electric Energy Savings (kWh)

Measure	*Ex Ante* Per-Measure Deemed Savings	*Ex Ante* Savings	Audited Gross Savings	Verified Gross Savings	*Ex Post* Per-Measure Savings	*Ex Post* Gross Savings
9-Watt LED	8.6	1,437,118	1,437,118	1,359,014	16.2	2,718,028
Realization Rate (*Ex Post* Gross / *Ex Ante*)						**189%**

Note: This table assumes an 87% installation rate.

Table 46. 2020 CBL Program *Ex Ante* and *Ex Post* Peak Demand Reduction (kW)

Measure	*Ex Ante* Per-Measure Deemed Reduction	*Ex Ante* Reduction	Audited Gross Reduction	Verified Gross Reduction	*Ex Post* Per-Measure Reduction	*Ex Post* Gross Reduction
9-Watt LED	0.0012	197	197	186	0.0022	372
Realization Rate (*Ex Post* Gross / *Ex Ante*)						**189%**

Note: This table assumes an 87% installation rate.

Ex Post Net Savings

The evaluation team applied a deemed NTG of 100% to the CBL program based on the hypothesis that lower-income customers would not have purchased or installed the energy-efficient product without program assistance, a hypothesis validated based on customer feedback from the 2019 evaluation on-site pantry visits. Table 47 and Table 48 outline the program *ex post* net savings and net reduction, respectively.

Table 47. 2020 CBL Program *Ex Post* Net Savings (kWh)

Measure	*Ex Post* Gross Savings	NTG	*Ex Post* Net Savings
9-Watt LED	2,718,028	100%	2,718,028

Table 48. 2020 CBL Program *Ex Post* Net Reduction (kW)

Measure	*Ex Post* Gross Reduction	NTG	*Ex Post* Net Reduction
9-Watt LED	372	100%	372

Leakage

In 2020, the evaluation team added a question to the bulb recipient survey to assess whether the bulbs received were being installed outside of IPL's service territory. The evaluation team reviewed the zip codes provided by survey respondents (n=24) and found one respondent (4% of completed surveys) in a zip code outside the IPL service territory, which results in a leakage estimate of 4%. Table 49 shows the percentage of bulbs distributed to survey participants that provided their zip code. The leakage calculation is provided for informational purposes and was not factored into evaluated results.

Table 49. 2020 CBL Program Percentage of Bulbs Distributed by Zip Code for Leakage

Zip Code	*Percentage of Bulbs Distributed*	*IPL Territory*
46226	24%	Yes
46218	18%	Yes
46235	14%	Yes
46222	10%	Yes
46224	8%	Yes
46201	6%	Yes
46219	6%	Yes
46176	4%	No
46208	4%	Yes
46033	2%	Yes
46107	2%	Yes
46202	2%	Yes

Process Evaluation

For the process evaluation, the evaluation team conducted two activities that provided insights into program successes and challenges, bulb recipient experience, and the program effectiveness in increasing recipient awareness of the IQW program.

- Interviewed IPL and CLEAResult staff
- Conducted an online survey with food pantry bulb recipients

Program Delivery

IPL designed the CBL program to serve its lower-income customers who might not participate in its other energy efficiency programs (which require the purchase of energy-efficient items). To provide this customer segment with more information about cost-saving energy efficiency choices and to increase their access to LEDs, IPL partnered with two food banks, Gleaners and Midwest, that both operate dozens of smaller food pantries within IPL's service territory. Some food pantries closed in 2020 due to

COVID-19, therefore the number of participating pantries declined from 79 pantries in 2018 and 2019 to 43 in 2020.

The evaluation team interviewed the IPL CBL program manager and the CLEAResult program manager, who said the program operated successfully in its third year. They reported that they distributed half the amount of program bulbs in 2020 as they did in 2019 and at fewer food pantries than previously, although the food banks remained the same in 2020 as in prior years. The smaller number of bulbs stemmed from IPL's planned decrease in LED promotion. After increasing the frequency of program bulb distributions in 2019 from twice a year to quarterly, in 2020 CLEAResult staggered the planned bulb distributions so that each food pantry would receive bulbs every other quarter, one group in January and July and the other in April and October. However, in the spring of 2020, the effects of the COVID-19 pandemic significantly increased pressure on food pantries for their core services, so IPL delayed the bulb distributions scheduled for the second quarter, waiting until the third quarter. IPL proceeded with the plan and CLEAResult distributed bulbs to both food banks in quarter three. In 2020, CLEAResult successfully distributed all 167,664 program LEDs intended for recipients, despite COVID-19–related disruptions. Although the CBL program had lower participation 2020, IPL speculated that food pantries reached a more varied audience after the onset of the COVID-19 pandemic, stemming from the sudden economic recession and increased demand for food pantries among households that may not have previously used them.

In 2020, Gleaners continued to use its staff to distribute LEDs to food pantries and to track the distribution of inventory. Due to staffing constraints at Midwest, CLEAResult continued to take responsibility for distributing LEDs to food pantries on behalf of the food bank in 2020, as it had in 2019. Food pantry staff received education from their food bank about the program's intent and the bulb packaging's eScore promotion and survey link. Gleaners provided this education to its food pantries, while CLEAResult educated the food pantries that operate under Midwest. Gleaners and CLEAResult instructed food pantry staff and volunteers to only distribute one pack per person, but there were no restrictions about customers' receiving an additional pack in another quarter's distribution.

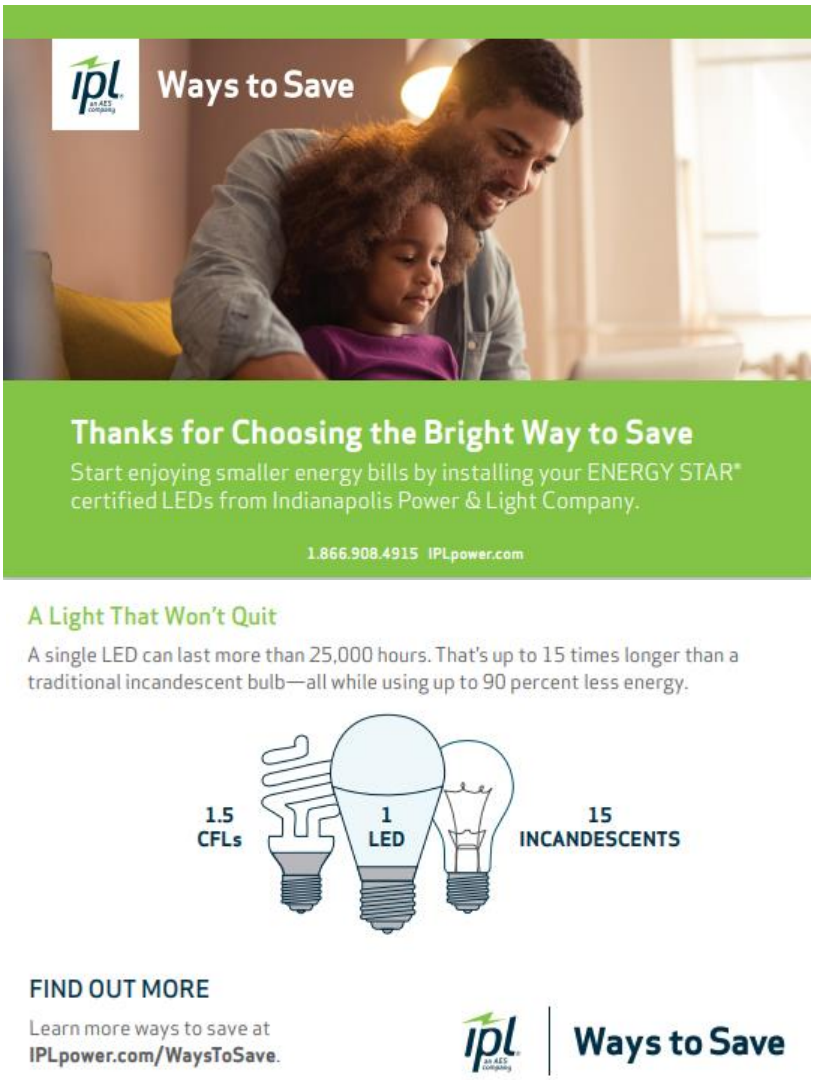
Other than the temporary interruption of bulb distributions in quarter two, IPL cited declining savings associated with LED bulbs due to pending federal standard as the primary program challenge. IPL anticipated the EISA backstop going into effect and used a lower savings value per bulb in 2020. While this was not unique to the CBL program, LED bulbs are the sole measure offered through the CBL program. For the next program cycle, CLEAResult is considering the possibility of extending bulb offerings beyond the standard 9-watt type to keep up with overall trends in LED adoption and to continue to provide innovative solutions for low-income households. As in prior years, neither IPL nor CLEAResult expressed concern about reaching 100% LED saturation in the targeted population, both because of the demonstrated high need for LEDs among this group and due to the high level of turnover, particularly with the negative economic effect of the COVID-19 pandemic.

Program Education and Cross-Promotion

One primary objective of the program is to educate economically disadvantaged customers on energy efficiency and behavior change opportunities so they can begin saving money on utility bills

immediately. IPL provided education on the bulb packaging, explaining that this packaging served as the main source of education about LEDs and other ways to save energy. IPL did not change the content in 2020, except updating the evaluation survey incentive from $15 per respondent to a drawing for a $100 gift card. Figure 35 shows how IPL used images and graphics on the bulb packaging to highlight the longevity of LED bulbs (A Light that Won't Quit) and tips for bulb selection (Save on the Bright Side and The Many Colors of Efficiency). Other details urge participants to install the LEDs in the package (Thanks for Choosing the Bright Way to Save) and highlight the energy and money saving advantages of LEDs (Shining a Light on LEDs). General guidance to find out more "Ways to Save" is grouped with LED educational content. Overall, the packaging emphasizes bulb longevity and bulb selection, with less content about saving energy or money by installing the bulbs.

Figure 35. 2020 CBL Program Bulb Packaging Education about LEDs

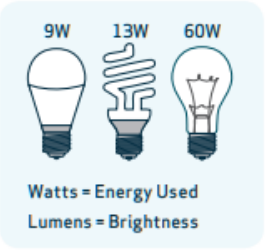


Shining a Light on LEDs

By replacing your traditional incandescent light bulbs with LED bulbs, you'll lower your energy use and maintenance costs. Read on to find out how to choose the right LEDs for your home.

Save on the Bright Side

ENERGY STAR certified LEDs provide the same brightness (lumens) as traditional bulbs, using less energy (watts). Select the light output that matches your old incandescent bulbs and enjoy long-term savings.



HOW MANY LUMENS DO YOU NEED?

Lumens	450+	800+	1100+	1600+
LED	5W	9W	13W	17W
CFL	11W	13W	20W	23W
Standard	40W	60W	75W	100W

The Many Colors of Efficiency

Light color is measured on the Kelvin (K) temperature scale, with a lower K number giving off a warmer, yellowish glow and a higher K providing cooler, bluer light.

Warm or Soft White
Good for:
- Living rooms
- Family rooms
- Bedrooms

Use in wall sconces and lamps

Cool or Natural White
Good for:
- Kitchens
- Garages
- Bathrooms
- Basements

Use in bathroom vanities and pendant fixtures

Natural or Daylight
Good for:
- Reading areas
- Detail-oriented activities

Use in track lighting, recessed cans and outdoor exposed lamps

Similarly, IPL used the bulb packaging to cross-promote the eScore Home Energy Assessment program, which was offered for free to qualifying participants in 2020 and did not require any purchase to participate. At the larger food pantries, IPL also provided posters with information about the eScore program. Figure 36 shows the bulb packaging that IPL used to promote eScore.

Figure 36. 2020 CBL Program Bulb Packaging Promotion of eScore

Due to the high turnover at food pantries, IPL does not provide food pantry staff and volunteers with talking points about LEDs or the IQW program. The evaluation team also observed during the 2019 site visit that in-depth discussions about energy efficiency with the food pantry population is not feasible due to the fast pace of food pantry services and the large size of the population served.

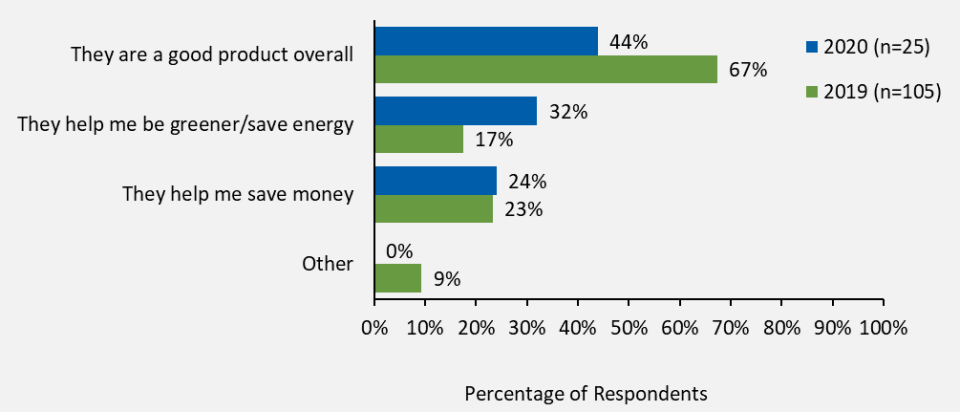
Bulb Recipient Satisfaction and Experience

The survey included questions about the customers' experience with the program, whether and how many bulbs they installed, and whether they were interested in receiving a home energy audit. While 37% of respondents (n=10) reported receiving one package of light bulbs (the number intended by program design), 44% reported receiving two, 4% received three, 11% received four packages (representing three respondents), and one respondent reported receiving five packages (4%).

Satisfaction

The 2020 program survey received 26 qualifying responses, though the number of responses varied slightly between questions. All respondents reported being *very satisfied* (96%) or *somewhat satisfied* (4%) with the LEDs they received (n=25). Some respondents explained the reason for their positive satisfaction ratings (shown in Figure 37). Respondents most commonly cited the good quality of the product (44%; n=11), while many said they liked help from IPL to be greener or save energy (32%; n=8). Other respondents appreciated that the bulbs helped them to save money (24%; n=6). Respondents in 2020 were somewhat more likely to report that their satisfaction stemmed from saving energy, compared to respondents in 2019 who more commonly cited the quality of the product (however, note that the evaluation team coded 2019 results from open-ended responses, so the total counts may be overrepresented and differences were not statistically different).

Figure 37. Reasons for Positive CBL Program Satisfaction Ratings

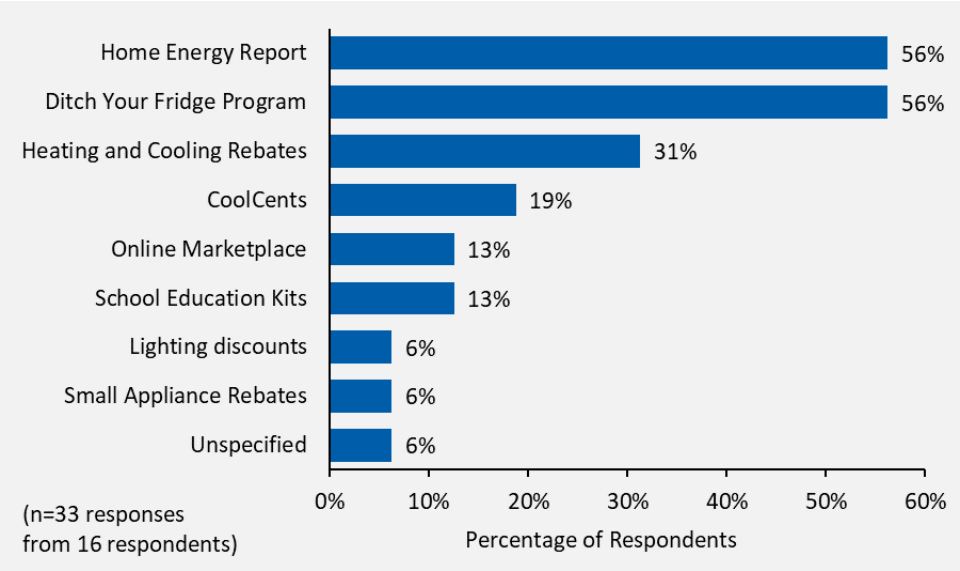


Source: 2020 IPL Community Based Lighting Program Participant Survey Question B9. "What was it about the lightbulb that made you pick that rating?" The evaluation team binned open-ended responses into response categories.

Awareness of Other Programs

Most respondents to the 2020 survey (62%; n=16) were aware that IPL offered the eScore Home Energy Assessment program. Of the aware respondents, six said they learned about eScore from a bill insert (38%), while five said they learned about eScore on the CBL program bulb packaging (31%) and the remaining five respondents heard of eScore through word of mouth, email, or a mailer (31%). When asked about their awareness of other energy efficiency programs offered by IPL (asked separately from awareness of the eScore Home Energy Assessment program in 2020), respondents most frequently reported being aware of the Home Energy Reports (Peer Comparison Program) and the Ditch Your Fridge program (each 56%; n=9), as shown in Figure 38.

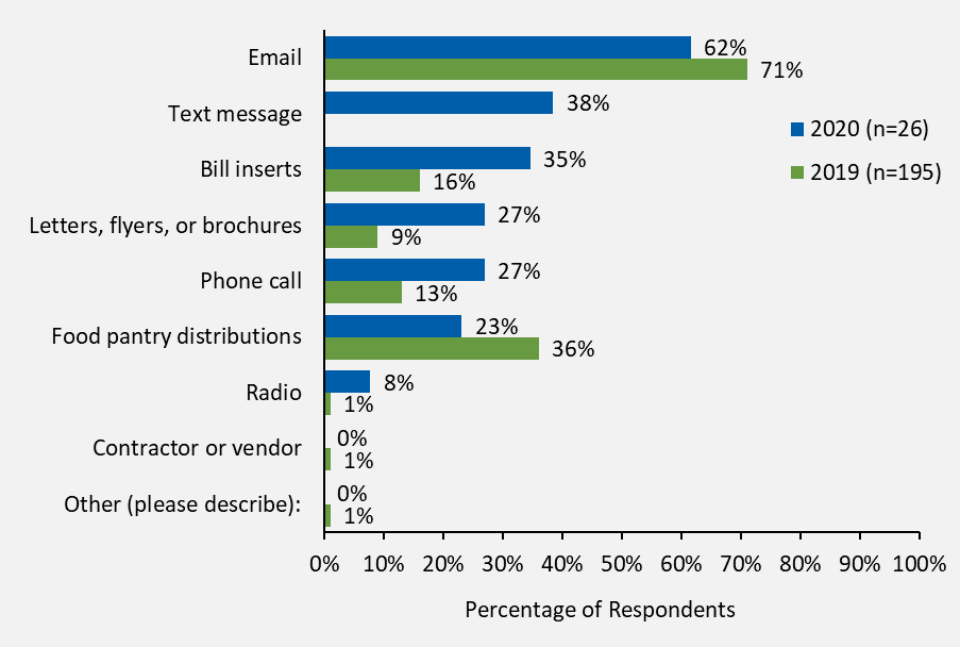
Figure 38. Other IPL Programs Identified by 2020 CBL Program Participants



Source: 2020 IPL Community Based Lighting Program Participant Survey Question B15. "What programs have you heard of?" Multiple responses allowed.

As shown in Figure 39, most customers (62%; n=16) reported that email is the best way for IPL to keep them informed of other energy efficiency programs and rebates. Also, 38% of respondents identified text messages as a valuable way to keep them informed, followed by bill inserts (35%). Six respondents (23%) said that food pantry distributions are a good way to reach out to them about IPL energy efficiency programs and rebates. Compared to respondents in 2019, respondents in 2020 seemed to slightly favor bill inserts, letters, flyers, brochures, or phone calls and were less likely to mention food pantry distributions, however differences were not significant. The 2019 survey did not offer text messages as a response option.

Figure 39. Best Ways to Keep CBL Program Participants Informed



Source: 2020 IPL Community Based Lighting Program Participant Survey Question B16. "In the future, what is the best way to inform you about energy efficiency programs and rebates offered by IPL?" Multiple responses allowed. Note that the evaluation team added text messaging as an additional option in the 2020 survey.

Uninstalled Bulbs

The 2020 survey included a new question to gauge the disposition of bulbs that respondents had not installed. All four respondents to the question said that the bulbs they had not installed had been put into storage for later use. No respondents indicated that they had sold, given away, donated, thrown away or installed leftover bulbs elsewhere.

Follow-Up on 2019 Evaluation Recommendations

The evaluation team gathered feedback from IPL and CLEAResult on the status of recommendations made during the 2019 evaluation. IPL's efforts to address those recommendations is shown in Table 50.

Table 50. CBL Program 2019 Recommendation Status

2019 Recommendation	Status
Build on the momentum gained through the introduction of LEDs by connecting recipients with other IPL energy- and cost-saving opportunities. There are several possible strategies: • Many customers indicated that they shop at stores that participate in the upstream lighting incentives through the Lighting and Appliance program. To encourage further action, include details on the bulb packaging that lists participating retailers and the IPL Marketplace as resources if customers want to purchase additional energy-efficient products. • Consider changing which IPL programs are cross-promoted on the bulb packing every six months to expose customers to additional options.	***Partially Completed.*** IPL continued to use the bulb packing to promote its eScore Home Energy Assessment program and a link to its "Ways to Save" webpage in 2020. IPL chose not to promote upstream retailers or its other programs in 2020 but may add this content in the future.
In subsequent surveys, include questions to explore installation rates for repeat participants and whether they gave away or sold the free bulbs.	***Completed.*** The 2020 survey included options for respondents to describe what they may have done with uninstalled bulbs.

Conclusions and Recommendations

CONCLUSION 1: Despite a challenging and disrupted year, the CBL program operated smoothly, and delivered a needed service, as demonstrated by a high level of satisfaction and high installation rate.

Despite COVID-19–related scheduling hurdles, the CBL program staff and food banks successfully distributed all the available bulbs to participants. The proportion of participants who received more than one package of bulbs and the high installation rate demonstrate the need for LED bulbs in the target population. All survey respondents expressed satisfaction with the program, most commonly citing the quality of the bulbs and the opportunity to be greener, save energy, or save money.

CONCLUSION 2: *Ex ante* savings calculations assume a 20-watt baseline replacement lamp. Because the EISA 2020 backstop has not gone into effect, the most appropriate baseline is one developed based on participating customer survey responses.

In confirming *ex ante* savings, the evaluation team determined that the implementation team used a 20-watt baseline replacement lamp in their savings calculation. While this aligns with previous years' reports based on the expected implementation of the EISA 2020 backstop, the Trump administration voided that backstop in 2019. The evaluation team used an alternative approach to develop baseline lamp savings assumptions, utilizing customer survey responses from the 2019 and 2020 program years. Using these responses, the evaluation team determined a new weighted average baseline lamp with a hypothetical consumption of 31 watts.

CONCLUSION 3: Opportunity exists to better align the bulb packaging's educational content with the program's target audience and to encourage increased ISRs.

The bulb packaging is the primary mechanism for fulfilling the program objective of educating program participants; however, the existing content does not emphasize the information needed to encourage participants to immediately install the bulbs. The packaging most prominently highlights the longevity of

LED bulbs, followed by tips for bulb selection, which is most relevant to bulb purchasers even though the program is specifically designed not to require any purchasing. The packaging devotes less content to address the energy and monetary savings from installing the bulbs right away, which would be much more relevant to these participants because they just received free LEDs.

RECOMMENDATION

Modify the bulb packaging content to put a larger emphasis on the energy and monetary savings value of installing the LEDs to replace working incandescent bulbs. To encourage customers to purchase discounted lighting in the future, IPL could reframe the existing content to convey that the bulbs are more cost-effective over the long term than incandescent bulbs.

CONCLUSION 4: Bulb packaging remains an important method for cross-promoting IPL programs.

The CBL program bulb packaging cross-promotes the eScore Home Energy Assessment program and mentions "Ways to Save" through other energy efficiency programs and rebates offered by IPL. Survey respondents reported similar levels of awareness of the eScore Home Energy Assessment, Home Energy Reports (Peer Comparison program), and ARP programs.

Survey responses indicate that the CBL program bulb packaging is an effective strategy for marketing IPL's other programs: awareness sources for the eScore program were spread evenly between the CBL program bulb packaging and bill inserts, followed by word of mouth. CBL program participants also viewed food pantries as a good source of information, with 23% of survey respondents saying that food pantries are the best way to keep them informed of IPL efficiency programs. Most prefer to be contacted by email, text messages, or bill inserts.

RECOMMENDATION

Improve the cross-promotion of IPL's other programs through several strategies:

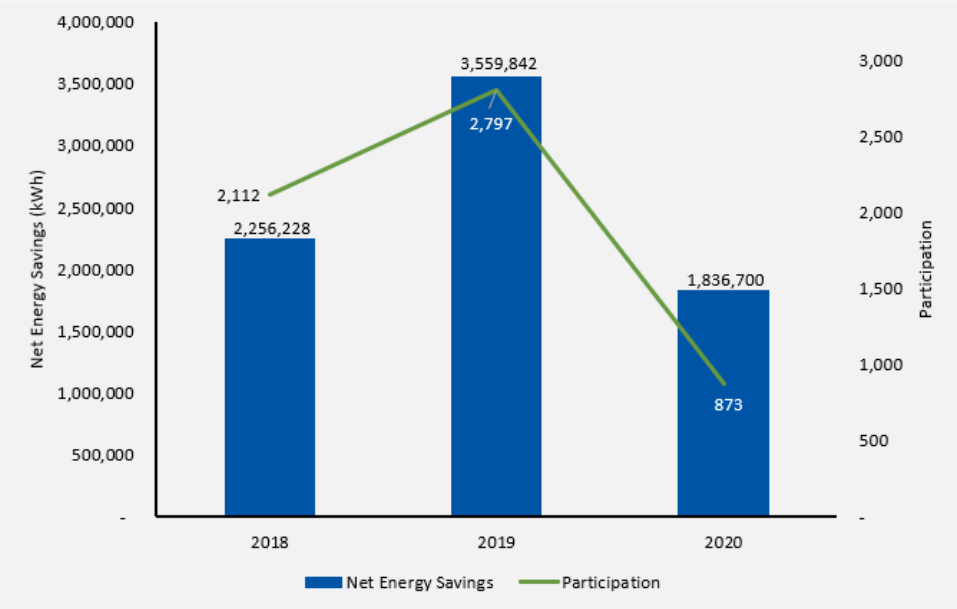
- Position the "Ways to Save" URL with related content on the bulb packaging (or otherwise distinguish it from other content).
- Dedicate more space on the bulb packaging to program cross-promotion or change which program is cross-promoted every six months.
- Offer customers a way to opt-in to text message alerts about ways to save energy. In these texts, including links to incentives, tips or reminders about bulb installation, and energy efficiency education.

Income Qualified Weatherization Program

Through the IQW program, IPL offers opportunities for customers to save energy through direct install measures, energy-saving kits, and add-on measures. The program implementer, CLEAResult, is responsible for program marketing and outreach, scheduling and conducting the eScore Home Energy Assessments, distributing kits, and determining customer eligibility for add-on measures.

IPL achieved only 47% of the program energy-savings goal in 2020, likely due to the COVID-19 pandemic, which caused IPL to halt all in-person program activities starting in March through the remainder of the 2020 year. Although CLEAResult successfully pivoted to distributing energy-saving program measures through kits and virtual audits, in-person energy-saving actions—including direct install measures, weatherization measures, and refrigerator replacements—have historically been the core contributors to program savings. For example, in 2019, the direct install and add-on measures accounted for 90% of the program *ex post* gross savings, of which 62% was from direct install measures installed during in-person Home Energy Assessment visits. Figure 40 shows the program's energy savings and participation from 2018 to 2020.

Figure 40. IQW Program Savings and Participation 2018-2020



Sources: Indianapolis Power & Light Company. Year-End DSM Scorecards for 2018, 2019, and 2020; Cadmus. Demand-Side Management Evaluation Report for 2018, 2019

Program Description

Customers can participate in the program by completing an online Home Review or by scheduling a Home Energy Assessment. For the online Home Review, customers enter information about their home and receive recommendations for improvements. Customers are encouraged, but not required, to

complete this online Home Review while they are online scheduling their Home Energy Assessment.[17] IPL also allows customers to complete the online Home Review after the Home Energy Assessment or in absence of the Home Energy Assessment.

Once they complete the online Home Review, participants are sent an energy-savings kit. A planned change for 2020, customers can pick from three different kits: (1) the Home Efficiency Starter kit,[18] (2) the Bathroom Refresher kit, or (3) the Tech-Savvy kit. The full kit contents are shown in Table 51.

Table 51. 2020 IQW Program Kit Options and Contents

Option #1 Home Efficiency Starter Kit (and in-person assessment kit)	Option #2 Bathroom Refresher Kit	Option #3 Tech-Savvy Kit
• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • $10.00 gift certificate to Lowes	• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • $10.00 gift certificate to Lowes • 1 spa-style wide showerhead (1.5 gpm) • 1 kitchen faucet aerator (1.5 gpm)	• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • $10.00 gift certificate to Lowes • 1 advanced power strip (Tier 1)

From January through March 2020, CLEAResult provided in-person Home Energy Assessments to income-eligible customers (whose income is at or below 200% of the federal poverty level). While at a home, CLEAResult evaluated home energy use, replaced inefficient equipment with direct install measures, and assessed the home for add-on measures.

Upon completing a Home Energy Assessment, CLEAResult discussed home-tailored recommendations to help the occupants save energy. The technician later emailed the customer a link to the assessment report, which contained several types of information:

- A summary of the customer home energy use
- Recommendations for actions and energy efficiency upgrades beyond those directly installed during the Home Energy Assessment
- Information about other IPL programs
- Tips and recommendations intended to drive energy-saving behavioral changes

[17] Customers can also schedule their Home Energy Assessment by contacting CLEAResult directly.

[18] This kit contains the same contents as the general program kit provided in prior years.

During the 2020 eScore Home Energy Assessment, CLEAResult technicians determined whether participants were eligible for additional, no-cost measures:

- Duct sealing for customers with electric heating or cooling and ducts in an unconditioned space
- Air sealing for customers with electric heating or cooling systems and a measured opportunity from the blower door test greater than 20% and less than 60%
- Attic insulation for customers with electric heating or cooling and existing attic insulation of less than or equal to R-19
- Wall insulation for customers with electric heating or cooling and existing wall insulation of less than or equal to R-11
- Refrigerator replacement for customers with existing refrigerators that are not ENERGY STAR and are at least 10 years old
- Radiant barrier for customers who do not already have radiant barrier and have electric heat

CLEAResult technicians installed add-on measures, listed in Table 52, during subsequent Phase 2 and Phase 3 customer home visits. CLEAResult performed air and duct sealing work during a Phase 2 visit, during which the home Energy Advisor is also typically present for at least a portion of the visit. Eligible customers could have attic insulation, wall insulation, radiant barriers, and refrigerators installed during a Phase 3 visit. As noted earlier, these in-home activities ceased after March 2020.

Table 52. 2020 IQW Program Direct Install and Add-On Measures

Direct Install Measures	Add-On Measures
• LEDs (9-watt, 16-watt, 5-watt, 7-watt, R30, and 9-watt exterior) • Bathroom (1.0 gpm) and kitchen (1.5 gpm) faucet aerators • Low-flow showerheads (1.5 gpm) • Pipe wrap insulation • Smart power strips • Programmable thermostats • Smart thermostats (if concurrently enrolled in the Demand Response program)	• Attic insulation • Radiant barrier • Wall insulation • Air sealing • Duct sealing • Refrigerator replacement

Once the COVID-19 pandemic hit, IPL ceased in-person program activities for the remainder of the year, and instead began offering virtual assessments in June 2020. Participants now schedule their assessment through the online portal, similar to how scheduling was for their Home Energy Assessment experience. After the customer completes a virtual home assessment, they are eligible for a custom kit from the CLEAResult technician who conducted the virtual assessment.

IPL offers the IQW program to all qualifying customers but only claims savings based on the fuel types for electric space cooling and heating and water heating:

- For properties with non-electric space heating, IPL does not claim savings for programmable thermostats
- For properties with non-electric space cooling and heating, IPL does not claim savings for the furnace whistle

- For properties with either non-electric space cooling or non-electric heating, IPL claims partial savings for the furnace whistle
- For properties with non-electric water heating, IPL does not claim savings for aerators or showerheads

Research Objectives

To evaluate the 2020 IPL IQW program, the evaluation team conducted process and impact research activities to address several objectives:

- Identify program improvement opportunities
- Assess participant satisfaction with the virtual assessment compared to those customers who received an in-person assessment, in order to inform whether the virtual option is an appropriate long-term program strategy
- Calculate program savings
- Assess whether the program collects proper project documentation and uses appropriate savings algorithms

Research Approach

The evaluation team conducted five activities to answer the research objectives:

- Interviewed IPL and CLEAResult program staff
- Reviewed the program tracking database
- Conducted an engineering review of savings assumptions for all measures (including individual measures within energy-savings kits)
- Conducted a participant survey with 2020 assessment, kit, and rebate participants
- Estimated ISR values from primary research

Program Performance

For 2020, IPL achieved 1,836,700 kWh of *ex post* net energy savings and 222 kW of *ex post* net demand reduction, achieving 47% of the energy-savings goal and 42% of the demand reduction goal (Table 53). This is lower than in 2019, when IPL achieved 110% of its energy-savings goal and 87% of its demand reduction goal. As noted, this is likely the result of the COVID-19 pandemic, which prevented CLEAResult from administering the in-person components that typically provide the majority of overall program savings.

Table 53. 2020 IQW Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	3,916,055	1,836,700	47%
Demand Reduction (kW)	530	222	42%
Participation (Homes)	3,058	873	29%
Budget	$2,770,789	$1,764,452	64%

Note: values rounded for reporting purposes.

Some program participants received both energy-savings kits and direct install measures during an eScore Home Energy Assessment. Program staff reported that this is intentional and allowed per program design. However, program participants who receive an energy-savings kit after receiving an eScore Home Energy Assessment and direct install measures may have more limited savings opportunities, particularly for 9-watt and 16-watt LED bulbs and the water-saving devices. IPL's scorecards did not include participants who received only energy-savings kits and did not include direct install measures in the quantity of assessments completed. However, it did include energy savings associated with these kits in the total program savings.

The reported program participation on the scorecards do not capture the full extent of 2020 program participation since the scorecards' participation metrics are based on the number of audits conducted during the program year and do not include customers who only received an energy-saving kit. In total, the program reached 6,100 distinct customers (about 200% of the participation goal) during 2020, despite IPL and CLEAResult being unable to administer the program as designed due to safety concerns related to the pandemic.

Table 54 provides evaluated results—including audited, verified, *ex post* gross, and *ex post* net savings—for the 2020 IQW program.

Table 54. 2020 IQW Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	2,798,751	2,803,722	1,281,907	1,836,700	1,836,700
Demand Reduction (kW)	447	431	168	222	222

The total *ex post* net savings are equivalent to *ex post* gross savings of 1,836,700 kWh and 222 kW because we applied a 100% NTG value. This is a reasonable evaluation approach since the IQW program targets low-income participants, who are unlikely to have installed additional energy-saving measures outside the program. This is also consistent with the evaluation teams' approach in prior years. As shown in Table 55, the program energy-savings realization rate was 66% and the demand reduction realization rate was 50%.

Table 55. 2020 IQW Program Realization Rates and Net-to-Gross Summary

Realization Rate		Freeridership	Spillover	NTG
Energy Savings (kWh)	Demand Reduction (kW)			
66%	50%	0%	0%	100%

The evaluation team made adjustments that impacted the energy savings, demand reduction, and realization rates. The overall program realization rates were lower than 100% because of adjustments the team made to the kit component savings. These adjustments are consistent with the approach used in both the 2018 and 2019 evaluations; however, the impact of these adjustments was greater in 2020 because the energy-saving kits contributed over half (54%) of program savings (compared to 10% of program savings in 2019). IPL made several adjustments to the kit components:

- ***Furnace whistles:*** The team applied *ex post* savings values to furnace whistles depending on the participant's cooling and heating system fuel types. The evaluation team assigned demand reduction only to the portion of customers with central AC.
- ***Water savings kit measures*:** The team adjusted savings for bathroom and kitchen faucet aerators and low-flow showerheads in cases where energy-savings kits were sent to homes with non-electric water heating.
- ***Other kit adjustments:*** The team adjusted savings for 9-watt and 16-watt LEDs, bathroom and kitchen faucet aerators, and low-flow showerheads in cases where energy-saving kits were sent to homes that received the kit after it already received a Home Energy Assessment. The team also adjusted savings for furnace whistles in cases where multiple energy-saving kits were sent to the same customer.

These approaches are detailed below in the *Impact Evaluation* section. The main reason the energy-savings realization rate is higher than the demand reduction realization rate is that the evaluation team adjusted kit measure savings based on the fuel types and HVAC systems. Overall, the per-unit savings increased for these kit measures (bathroom and kitchen faucet aerators, low-flow showerheads, and furnace whistles). However, these kit measures contribute more to demand reduction than to energy savings (for example, the furnace whistle contributes about half the demand reduction for most kits but only about one-fifth the energy savings).

The overall energy savings and demand reduction increased between the verified and *ex post* gross savings values because of the lighting measures. Overall, lighting measures had high realization rates because CLEAResult used lower baseline wattages for the *ex ante* savings than the evaluation team used to determine *ex post* savings values. For more details, see the *Impact Evaluation* section below.

Impact Evaluation

The evaluation team calculated audited, verified gross, *ex post* gross, and *ex post* net energy savings and demand reduction for each measure and for the program overall; each step is detailed in the following subsections.

Audited Savings

The evaluation team reviewed the program tracking database to confirm that measure quantities align with the program design and that deemed values were applied appropriately. When the team applied the savings values uniformly during the audit stage, the energy savings increased by about 4,971 kWh and the demand reduction decreased by about 16 kW. Almost all the in-person audit measures with deemed savings were affected by this adjustment (except programmable thermostats and the audit recommendation), as well as the direct install kit measures. Table 56 shows *ex ante* and audited quantities and per-unit savings. Audited savings reflect the adjustments described above.

Table 56. 2020 IQW Program *Ex Ante* and Audited Quantities and Savings

Measure	*Ex Ante* Quantity	*Ex Ante* Savings [a]		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
In-Person Audit						
16-Watt LED	217	0.723	5,276.94	217	0.651	4,726.26
5-Watt LED Candelabra	1,535	1.264	7,990.75	1,535	1.228	8,104.80
5-Watt LED Globe	1,673	3.104	21,583.55	1,673	3.179	21,615.16
7-Watt LED Track Light	167	0.145	1,054.76	167	0.134	940.21
9-Watt LED	2,954	3.728	27,205.42	2,954	3.545	25,788.42
Exterior 9-Watt LED	126	-	2,156.99	126	-	2,139.48
R30 LED	525	1.250	7,859.57	525	1.103	7,381.50
Bathroom Aerator	119	0.357	3,895.55	119	0.369	3,919.86
Kitchen Aerator	57	0.454	10,010.43	57	0.456	10,047.96
Low-Flow Showerhead	212	3.585	71,630.56	212	3.562	71,764.12
Programmable Thermostat (Heat Pump)	2	-	984.78	2	-	984.78
Programmable Thermostat (Electric Heat + Central AC)	1	-	969.20	1	-	969.20
Programmable Thermostat (Natural Gas Heat + Central AC)	15	-	1,709.61	15	-	1,709.61
Smart Thermostat with Enrollment (Heat Pump)	100	-	56,602.39	100	-	56,602.00
Smart Thermostat with Enrollment (Electric Heat + Central AC)	49	-	60,755.00	49	-	60,755.10
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	283	-	40,925.43	283	-	40,924.63
Pipe Wrap	226	0.679	5,114.92	226	0.678	5,103.08
Water Heater Setback	25	0.293	2,571.11	25	0.293	2,571.11
Audit Recommendation	716	-	54,201.20	716	-	54,201.20

Measure	*Ex Ante* Quantity	*Ex Ante* Savings [a]		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
Virtual Audit						
16-Watt LED	18	0.052	379.43	18	0.052	379.43
5-Watt LED Candelabra	105	0.381	2,778.26	105	0.378	2,778.26
5-Watt LED Globe	174	0.631	4,603.97	174	0.626	4,603.97
7-Watt LED Track Light	13	0.057	416.65	13	0.057	416.64
9-Watt LED	290	0.307	2,241.42	290	0.319	2,241.44
Exterior 9-Watt LED	5	-	240.41	5	-	240.41
R30 LED	39	0.227	1,656.89	39	0.226	1,656.89
Bathroom Aerator	44	0.138	1,450.86	44	0.136	1,450.86
Kitchen Aerator	8	0.064	1,412.42	8	0.065	1,412.42
Low-Flow Showerhead	44	0.731	14,922.91	44	0.730	14,922.91
Smart Power Strip	19	0.513	2,850.00	19	0.513	2,850.00
Audit Recommendation	157	-	11,884.90	157	-	11,884.90
Weatherization and Add-On Measures						
Air Sealing (Electric Heat + Central AC)	3	1.253	11,891.60	3	1.253	11,891.60
Air Sealing (Natural Gas Heat + Central AC)	7	0.161	439.93	7	0.161	439.93
Air Sealing (Heat Pump)	8	0.323	3,782.23	8	0.323	3,782.23
Duct Sealing (Heat Pump)	3	0.300	396.93	3	0.300	396.93
Duct Sealing (Electric Heat)	3	0.127	636.10	3	0.127	636.10
Attic Insulation	49,275	4.026	25,789.46	49,275	4.026	25,789.46
Radiant Barrier	5,670	0.379	2,730.11	5,670	0.379	2,730.11
Refrigerator Replacement	192	35.904	249,408.00	192	35.904	249,408.00
2021 Kits Combined						
11-Watt LED	4,413	7.224	52,712.83	4,413	7.061	52,712.84
16-Watt LED	4,413	12.754	93,022.65	4,413	12.798	93,022.51
9-Watt LED	4,413	4.678	34,108.30	4,413	4.854	34,108.52
LED Night-Light	4,413	-	60,177.43	4,413	-	60,177.43
Bathroom Aerator	4,413	13.861	145,514.26	4,413	13.680	145,514.26
Kitchen Aerator	1,379	11.117	243,466.59	1,379	11.170	243,466.59
Low-Flow Showerhead	1,379	22.900	467,697.50	1,379	22.891	467,697.50
Smart Power Strip	1,357	36.639	203,550.00	1,357	36.639	203,550.00
Furnace Whistle	4,412	214.092	604,885.20	4,412	213.982	604,885.20
IQW - Direct Install Kit	**852**	**62.729**	**171,205.71**	**852**	**46.860**	**178,425.84**
Three 9-Watt LEDs	-	-	-	-	-	-
LED Night-Light	-	-	-	-	-	-
Bathroom Aerator	-	-	-	-	-	-
Furnace Whistle	-	-	-	-	-	-
Total	**96,523**	**447**	**2,798,751**	**96,523**	**431**	**2,803,722**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include embedded ISRs.

During the audit, the team identified a few aspects of the tracking data that could be improved for more precise tracking. While we made no adjustments based on these findings, they are detailed below to

support improvements to future program implementation and data tracking. We also include data tracking improvements as specific recommendations within this report.

- ***Virtual and in-person audits.*** There was no indicator in the tracking data to differentiate between customers who received an in-person audit and customers who received a virtual audit. The evaluation team was able to distinguish the type of audits in 2020 based on the start date: in-person audit ended in March and virtual audits began on June 1. However, if both audit options are offered concurrently, there would not be a clear way to distinguish between them, especially since most of the measures overlap. Being able to differentiate the audit types is important to be able to accurately evaluate program savings since, as described further in the *Verified Savings* section, the virtual audit relies on a customer installing the measures while the in-person audit relies on a program contractor directly installing the measures, which can impact measure ISRs. It is also important to be able to appropriately identify customers by participation type (virtual or in-person) for future research efforts, which may be accomplished through customer surveys.
- ***Virtual audit measures.*** The virtual audit measures were inconsistently tracked within the program data. After the virtual audit, customers are eligible to receive a custom kit curated by CLEAResult.[19] Some virtual audit measures were associated with a custom kit flag within the program data, while others were tracked identically to the in-person direct install measures. In some cases, described further in the *Verified Savings* section, customers appear to have been sent more than one of the prescriptive energy-savings kits (the Home Starter kit, Tech-Savvy kit, or Bathroom Refresher kit) rather than a custom kit following their virtual assessment. Improving the tracking of the virtual audit measures will help distinguish between the in-person and virtual audits and ensure that customers' experience with virtual audits aligns with the program design.

Verified Savings

To determine verified measure quantities, the evaluation team applied measure adjustments, verification, and ISRs to audited measure quantities. To calculate verified savings, the evaluation team adjusted audited savings by replacing the embedded *ex ante* ISR with the verified ISR.[20]

Verification and Installation Rates

The evaluation team calculated ISRs (listed in Table 57) using measure-level primary data from the 2020 participant survey. The team increased the IQW participant survey target from 70 to 140. Despite this, however, because of limited customer responses, most sample sizes at the measure level were relatively small, especially for direct install bathroom aerators, kitchen aerators, and showerheads. In some instances where responses from IQW participants were limited, the team used ISRs calculated from the

[19] Program staff noted that if the measures identified during the virtual audit matched the contents of an existing prescriptive kit, the program would send customers a prescriptive kit to streamline its delivery.

[20] For more details on how the evaluation team calculated installation rates, please see *Appendix G*.

2020 Whole Home program participant survey (total n=210). This is a reasonable approach given that the delivery method for these measures is the same across both programs.

Table 57. 2020 IQW Program Installation Rates by Product Type

Measure	ISR	Source	Number Surveyed [a]
Direct Install Measures			
LED	86%	2020 IQW Survey	26
Bathroom Aerator [a, b]	100%	Assumed	0
Kitchen Aerator [a, b]	100%	Assumed	1
Low-Flow Showerhead [a, b]	100%	Assumed	7
Pipe Wrap	100%	Assumed	N/A
Programmable Thermostat [a, b]	100%	Assumed	0
Smart Thermostat	94%	2020 IQW Survey	26
Water Heater Setback	100%	Assumed	N/A
Audit Recommendation	100%	Assumed	N/A
Virtual Audit Kit Measures			
LED [c, d]	85%	2020 IQW Survey	86
Bathroom Aerator [d]	36%	2020 IQW Survey	86
Kitchen Aerator [e]	60%	2020 Whole Home Survey	25
Low-Flow Showerhead [e]	44%	2020 Whole Home Survey	25
Smart Power Strip [d]	81%	2020 IQW Survey	26
Audit Recommendation	100%	Assumed	N/A
Weatherization Measures			
Air Sealing	100%	Assumed	N/A
Duct Sealing	100%	Assumed	N/A
Radiant Barrier	100%	Assumed	N/A
Attic Insulation	100%	Assumed	N/A
Refrigerator Replacement	100%	Assumed	N/A

Measure	ISR	Source	Number Surveyed [a]
Energy-Saving Kit Measures			
LED [b]	85%	2020 IQW Survey	86
LED Night-Light	71%	2020 IQW Survey	86
Bathroom Aerator	36%	2020 IQW Survey	86
Kitchen Aerator [e]	60%	2020 Whole Home Survey	25
Low-Flow Showerhead [e]	44%	2020 Whole Home Survey	25
Smart Power Strip	81%	2020 IQW Survey	26
Furnace Whistle	22%	2020 IQW Survey	86

[a] These are the response counts for the measure-level ISR applied.

[b] Given the small number of survey responses, the team applied ISRs of 100% for these measures.

[c] This is the cumulative lifetime ISR that includes adjustments for carryover bulbs. The Indiana TRM (v2.2) does not have an up-to-date deemed ISR value for LEDs, so the team referenced the 2016 Pennsylvania TRM to establish the first-year ISR. Pennsylvania Public Utility Commission. June 2016. *Technical Reference Manual: State of Pennsylvania: Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards*. http://www.puc.pa.gov/pcdocs/1370278.docx

[d] Given the small number of survey responses, the team applied ISRs from the energy-saving kit measures because the measure delivery is similar. For both the virtual audit and energy-saving kit measures, customers receive a kit in the mail and must install the measures themselves.

[e] Given the small number of survey responses, the team applied ISRs from the 2020 Whole Home program survey (as the delivery method for these measures are the same between programs).

Carryover Bulbs

The evaluation team used a carryover bulb approach, described in the UMP and consistent with IPL's Lighting and Appliance program, to estimate carryover bulbs for the kit component of the IQW program. Carryover bulbs are defined as bulbs placed in storage during the first program year but installed in subsequent program years. The UMP recommends a 24% trajectory estimate, assuming that 24% of the remaining in-storage bulbs are installed in each subsequent year.

The team applied the initial first year ISR of 70% for kit measures (after extrapolating the estimated lifetime ISR for these bulbs using the 24% estimate plus a discount factor to account for the delay in installation). The team used this lifetime ISR instead of the originally calculated ISR for LEDs in the energy-savings kits to account for the future installation of bulbs in storage (shown in Table 58). Since the virtual audit measures are mailed to customers, who are then responsible for installing them, the team applied the same ISR for LEDs as for the energy-savings kits.

Table 58. 2020 IQW Program Adjusted Lifetime Installation Rates for Kit Lighting Measures

Year	Calendar Year	Cumulative ISR
Year 1	2020	70%
Year 2	2021	77%
Year 3	2022	81%
Year 4	2023	85%

Overall Verified Measure Quantity

To calculate verified quantities, the evaluation team applied the updated ISRs, including the LED lifetime installation rates developed to account for carryover bulbs, to the audited *ex ante* measure unit quantities.

CLEAResult does not track the fuel types for program kit recipients' space heating and cooling or water heating systems. Any IPL customer, regardless of their HVAC system or water heating fuel types, receives the same kit contents. Accordingly, customers with non-electric or incompatible systems can still receive the kits, but IPL cannot claim energy saving or demand reduction in these situations. The evaluation team made two adjustments that impacted energy-kit savings related to fuel type:

- ***Assigned savings for the bathroom aerator, kitchen aerator, and showerhead to the proportion of participants with an electric water heater.*** CLEAResult does not track water heating fuel type for kit recipients. As such, the program *ex ante* kit savings assume that all kit customers have electric water heating. In accordance with the Indiana TRM (v2.2), the evaluation team assumed that 27% of customers who received a kit use electric water heating and therefore only counted savings for those measures from 27% of kit customers.[21]
- ***Applied four verified per-unit savings values for the furnace whistle to account for the proportion of participants with different types of HVAC systems and fuels.*** The *ex ante* savings for furnace whistles assume savings from both heating and cooling. However, CLEAResult does not track the occurrence of central AC, heat pumps, or non-electric heating for kit recipients. Accordingly, the team applied four different per-unit savings values to the furnace whistle:
  - Participants with electric heating only: 110.58 kWh and 0 kW
  - Participants with electric heating and central AC: 137.10 kWh and 0.049 kW
  - Participants with non-electric heating and central AC: 36.53 kWh and 0.049 kW
  - Participants with no electric heating and no central AC: 0 kWh and 0 kW[22]

The evaluation team made two additional adjustments that impacted energy-kit savings:

- ***Removed double-counted savings.*** The team examined the tracking data for any customers who received both an energy-savings kit and direct install measures through an in-person Home Energy Assessment. According to CLEAResult, the energy advisors install 9-watt LEDs, 16-watt LEDs, bathroom and kitchen aerators, and showerheads in all eligible locations during an in-

[21] Per the Indiana TRM (v2.2), about 27% of Indiana households use electric water heating.

[22] Per the Indiana TRM (v2.2), about 63% of Indiana households have central AC and natural gas heating, 4% have a heat pump, 18% have central AC and electric heat, 2% have electric heat and no central AC, and 13% have only natural gas heat.

person assessment.[23] Therefore, when an in-person audit customer then receives a kit, there are no eligible sockets or sinks to install those overlapping measures. Accordingly, the team removed any savings from 9- and 16-watt LEDs, bathroom and kitchen aerators, and showerheads when recipients received a kit after their in-person assessment. This approach is consistent with the 2018 and 2019 evaluations.[24] This affected 22 customers, of whom six received one of the three new kits and 14 received the original kit.

- ***Removed extra furnace whistles.*** Some customers received multiple prescriptive energy-savings kits. For example, one customer received one Home Efficiency Starter kit and three Bathroom Refresher kits after their virtual audit. Accordingly, they received four gift cards, four furnace whistles, four bathroom aerators, three showerheads, three kitchen aerators, and 12 LEDs (four each of the 9-watt, 11-watt, and 16-watt LEDs). The evaluation team assumed that there *might* be eligible sockets and fixtures to install multiple LEDs and water savings devices; however, there is typically only one furnace per household where a furnace whistle can be installed. Accordingly, the team credited the program with a maximum of one furnace whistle per household[25] and removed the duplicates. There were 48 households with more than one kit—two received four kits, four received three kits, and 42 received two kits—which resulted in the team removing 56 furnace whistles from our savings calculations.

The resulting verified quantity was 86,569 measures (Table 59).

Table 59. 2020 IQW Program Audited and Verified Quantities

Measure	Audited Quantity	Installation Rate	Verified Quantity [a]
In-Person Audit			
16-Watt LED	217	86%	187
5-Watt LED Candelabra	1,535	86%	1,320
5-Watt LED Globe	1,673	86%	1,439
7-Watt LED Track Light	167	86%	144
9-Watt LED	2,954	86%	2,540
Exterior 9-Watt LED	126	86%	108
R30 LED	525	86%	452
Bathroom Aerator	119	100%	119
Kitchen Aerator	57	100%	57
Low-Flow Showerhead	212	100%	212

[23] Program energy advisors are instructed to prioritize installing direct install measures in high-usage, frequently used areas rather than lower-usage areas like utility closets. That said, the program intent is to maximize opportunities to install energy-saving measures, which is a main reason the program does not have strictly defined or enforced measure limits per household.

[24] The team did not apply this approach to the virtual audits because the program is designed such that the custom kits are delivered *after* the audit measure is submitted to the tracking data (since the virtual audit is used to inform the kit contents).

[25] The evaluation team defined a household as a record with a unique premise ID in the program tracking data.

Measure	Audited Quantity	Installation Rate	Verified Quantity [a]
Programmable Thermostat (Heat Pump)	2	100%	2
Programmable Thermostat (Electric Heat + Central AC)	1	100%	1
Programmable Thermostat (Natural Gas Heat + Central AC)	15	100%	15
Smart Thermostat with Enrollment (Heat Pump)	100	94%	94
Smart Thermostat with Enrollment (Electric Heat + Central AC)	49	94%	46
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	283	94%	266
Pipe Wrap	226	100%	226
Water Heater Setback	25	100%	25
Audit Recommendation	716	100%	716
Virtual Audit			
16-Watt LED [b]	18	85%	15
5-Watt LED Candelabra [b]	105	85%	89
5-Watt LED Globe [b]	174	85%	148
7-Watt LED Track Light [b]	13	85%	11
9-Watt LED [b]	290	85%	247
Exterior 9-Watt LED [b]	5	85%	4
R30 LED [b]	39	85%	33
Bathroom Aerator	44	36%	16
Kitchen Aerator	8	60%	5
Low-Flow Showerhead	44	44%	19
Smart Power Strip	19	81%	15
Audit Recommendation	157	100%	157
Weatherization and Add-On Measures			
Air Sealing (Electric Heat + Central AC)	3	100%	3
Air Sealing (Natural Gas Heat + Central AC)	7	100%	7
Air Sealing (Heat Pump)	8	100%	8
Duct Sealing (Heat Pump)	3	100%	3
Duct Sealing (Electric Heat)	3	100%	3
Attic Insulation	49,275	100%	49,275
Radiant Barrier	5,670	100%	5,670
Refrigerator Replacement	192	100%	192

Measure	Audited Quantity	Installation Rate	Verified Quantity [a]
2021 Kits Combined			
11-Watt LED [b]	4,413	85%	3,751
16-Watt LED [b]	4,413	85%	3,744
9-Watt LED [b]	4,413	85%	3,744
LED Night-Light	4,413	71%	3,133
Bathroom Aerator (Electric)	1,192	36%	428
Bathroom Aerator (Non-Electric)	3,221	36%	1,158
Kitchen Aerator (Electric)	372	60%	223
Kitchen Aerator (Non-Electric)	1,007	60%	604
Low-Flow Showerhead (Electric)	372	44%	163
Low-Flow Showerhead (Non-Electric)	1,007	44%	443
Smart Power Strip	1,357	81%	1,098
Furnace Whistle (Central AC only)	2,780	22%	604
Furnace Whistle (Electric Cooling + Heating)	794	22%	172
Furnace Whistle (Heating Only)	88	22%	19
Furnace Whistle (Natural Gas Heat + No Central AC)	750	22%	163
IQW - Direct Install Kit [c]	**852**	--	--
9-Watt LED [b]	2,556	85%	2,137
LED Night-Light	852	71%	605
Bathroom Aerator (Electric)	230	36%	81
Bathroom Aerator (Non-Electric)	622	36%	220
Furnace Whistle (Central AC Only)	537	22%	118
Furnace Whistle (Electric Cooling + Heating)	153	22%	34
Furnace Whistle (Heating Only)	17	22%	4
Furnace Whistle (Natural Gas Heat + No Central AC)	145	22%	32
Total	**100,783**	--	**86,569**

Note: Values rounded for reporting purposes.

[a] The verified quantity includes the ISR adjustment and measure quantity adjustments described in the Overall Verified Measure Quantity section.

[b] The ISR for the energy savings of the LEDs distributed through the energy-saving kit and virtual audit paths are the cumulative lifetime ISR that include adjustments to account for carryover bulbs through 2023.

[c] Kits overall audit quantity is a sum of the individual measures. This sum is not duplicated in the total ex post gross savings

Overall Verified Measure Savings

The team applied the ISRs and measure quantities to calculate verified savings. Table 60 shows the verified savings per measure.

Table 60. 2020 IQW Program Audited and Verified Savings by Product Type

Measure	Audited *Ex Ante* Savings [a]		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR) [b]	
	kW	kWh		kW	kWh
In-Person Audit					
16-Watt LED	0.651	4,726.26	86%	0.609	4,418.03
5-Watt LED Candelabra	1.228	8,104.80	86%	1.100	7,260.55
5-Watt LED Globe	3.179	21,615.16	86%	2.848	19,363.58
7-Watt LED Track Light	0.134	940.21	86%	0.120	842.27
9-Watt LED	3.545	25,788.42	86%	3.314	24,106.57
Exterior 9-Watt LED	-	2,139.48	86%	-	1,999.95
R30 LED	1.103	7,381.50	86%	0.988	6,612.59
Bathroom Aerator	0.369	3,919.86	100%	0.369	3,919.86
Kitchen Aerator	0.456	10,047.96	100%	0.456	10,047.96
Low-Flow Showerhead	3.562	71,764.12	100%	3.562	71,764.12
Programmable Thermostat (Heat Pump)	-	984.78	100%	-	984.78
Programmable Thermostat (Electric Heat + Central AC)	-	969.20	100%	-	969.20
Programmable Thermostat (Natural Gas Heat + Central AC)	-	1,709.61	100%	-	1,709.61
Smart Thermostat with Enrollment (Heat Pump)	-	56,602.00	94%	-	53,205.88
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	60,755.10	94%	-	57,109.79
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	40,924.63	94%	-	38,469.15
Pipe Wrap	0.678	5,103.08	100%	0.678	5,103.08
Water Heater Setback	0.293	2,571.11	100%	0.465	4,078.23
Audit Recommendation	-	54,201.20	100%	-	54,201.20
Virtual Audit					
16-Watt LED [c]	0.052	379.43	85%	0.044	322.51
5-Watt LED Candelabra [c]	0.378	2,778.26	85%	0.321	2,361.52
5-Watt LED Globe [c]	0.626	4,603.97	85%	0.532	3,913.37
7-Watt LED Track Light [c]	0.057	416.64	85%	0.049	354.15
9-Watt LED [c]	0.319	2,241.44	85%	0.271	1,905.22
Exterior 9-Watt LED [c]	-	240.41	85%	-	204.35
R30 LED [c]	0.226	1,656.89	85%	0.192	1,408.36
Bathroom Aerator	0.136	1,450.86	36%	0.049	522.31
Kitchen Aerator	0.065	1,412.42	60%	0.039	847.45
Low-Flow Showerhead	0.730	14,922.91	44%	0.321	6,566.08
Smart Power Strip	0.513	2,850.00	81%	0.416	2,308.50
Audit Recommendation	-	11,884.90	100%	-	11,884.90

Measure	Audited *Ex Ante* Savings [a]		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR) [b]	
	kW	kWh		kW	kWh
Weatherization and Add-On Measures					
Air Sealing (Electric Heat + Central AC)	1.253	11,891.60	100%	1.253	11,891.60
Air Sealing (Natural Gas Heat + Central AC)	0.161	439.93	100%	0.161	439.93
Air Sealing (Heat Pump)	0.323	3,782.23	100%	0.323	3,782.23
Duct Sealing (Heat Pump)	0.300	396.93	100%	0.300	396.93
Duct Sealing (Electric Heat)	0.127	636.10	100%	0.127	636.10
Attic Insulation	4.026	25,789.46	100%	4.026	25,789.46
Radiant Barrier	0.379	2,730.11	100%	0.379	2,730.11
Refrigerator Replacement	35.904	249,408.00	100%	35.904	249,408.00
2021 Kits Combined					
11-Watt LED [c]	7.061	52,712.84	85%	7.231	53,983.03
16-Watt LED [c]	12.798	93,022.51	85%	13.082	95,091.32
9-Watt LED [c]	4.854	34,108.52	85%	4.962	34,867.09
LED Night-Light	-	60,177.43	71%	-	42,725.98
Bathroom Aerator (Electric)	3.694	39,288.85	36%	1.327	14,118.35
Bathroom Aerator (Non-Electric)	9.987	106,225.41	36%	-	-
Kitchen Aerator (Electric)	3.016	65,735.98	60%	1.805	39,335.66
Kitchen Aerator (Non-Electric)	8.154	177,730.61	60%	-	-
Low-Flow Showerhead (Electric)	6.181	126,278.33	44%	2.712	55,413.23
Low-Flow Showerhead (Non-Electric)	16.711	341,419.18	44%	-	-
Smart Power Strip	36.639	203,550.00	81%	29.656	164,754.00
Furnace Whistle (Central AC only)	134.809	381,077.68	22%	29.297	22,051.66
Furnace Whistle (Electric Cooling + Heating)	38.517	108,879.34	22%	8.370	23,649.42
Furnace Whistle (Heating Only)	4.280	12,097.70	22%	-	1,927.66
Furnace Whistle (Natural Gas Heat + No Central AC)	36.377	102,830.48	22%	-	-
IQW - Direct Install Kit	**46.860**	**178,425.84**		**10.294**	**40,149.77**
9-Watt LED [c]	-	-	85%	2.671	19,899.15
LED Night-Light	-	-	71%	-	8,248.93
Bathroom Aerator (Electric)	-	-	36%	0.256	2,685.87
Bathroom Aerator (Non-Electric)	-	-	36%	-	-
Furnace Whistle (Central AC Only)	-	-	22%	5.730	4,313.13
Furnace Whistle (Electric Cooling + Heating)	-	-	22%	1.637	4,625.64
Furnace Whistle (Heating Only)	-	-	22%	-	377.04
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	22%	-	-
Total	**431**	**2,803,722**		**168**	**1,281,907**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include the embedded ISRs.

[b] The verified savings includes the ISR adjustment and measure quantity adjustments described in the Overall Verified Measure Quantity section.

[c] The ISR for the energy savings of the LEDs distributed through the energy-saving kit and virtual audit are the cumulative lifetime ISR that includes adjustments to account for carryover bulbs through 2023.

Ex Post Gross Savings

The evaluation team calculated *ex post* gross per-measure savings using algorithms and variable assumptions from the Indiana TRM (v2.2) and the UMP, similar to the 2018 and 2019 analyses. Discrepancies in LED assumptions accounted for the greatest differences between *ex ante* and *ex post* savings. *Appendix G* presents the algorithms, variable assumptions, and specific references for all program measure *ex post* calculations. It also contains detailed explanations of the differences between *ex ante* and *ex post* savings.

The differences in baseline wattages (shown in Table 61) used to calculate savings for lighting measures are the primary reason for the variation between *ex ante* and the *ex post* gross savings, as well as for the high realization rates across lighting measures (see Table 62). CLEAResult used lower baseline wattages in 2020 than in 2019, while the evaluation team used the same baseline wattages in both years. The team assumes that CLEAResult used these lower baseline wattages in anticipation of the EISA backstop. However, since the EISA backstop was not implemented (and halogen bulbs were still available), the evaluation team still factored halogen bulbs into the baseline wattages for the *ex post* savings values. The evaluation team applied UMP baseline wattages based on a range of 450 lumens to 1,599 lumens. In addition, for the kit LED measures, the team applied the Indiana TRM (v2.2) assumption of kit AOH, which results in higher realization rates for kit LEDs versus direct install LEDs. Direct install and kit AOH are provided in *Appendix G*.

Table 61. 2019 and 2020 IQW Program LED Baseline Wattages

Measure	*Ex Ante*		*Ex Post*	
	2019	2020	2019	2020
9-Watt LED	30.42	20.00	43.00	43.00
16-Watt LED	54.56	46.00	65.00	65.00
5-Watt Globe LED	40.00	20.00	40.00	40.00
5-Watt Candelabra LED	40.00	9.00	40.00	40.00
7-Watt Track LED	29.00	13.00	50.00	50.00
9-Watt Exterior LED	30.42	20.00	43.00	43.00
R30 LED	65.00	24.00	65.00	65.00

The difference between the *ex ante* and *ex post* gross savings for the water heater setback is a result of actual tank size and water heater temperature conditions only being captured for nine of 26 water heater setback projects. When the actual conditions were not available, the team applied the Indiana TRM (v2.2)–based assumptions for the water heater tank size and outlet temperature prior to setback.

Table 62 shows a comparison of total *ex ante* deemed savings and total *ex post* gross savings by measure. Applying realization rates by each measure, the table shows gross savings variations between *ex ante* and *ex post*.

Table 62. 2020 IQW Program *Ex Ante* and *Ex Post* Gross Savings by Measure Summary

Measure	*Ex Ante* Savings (With Embedded ISRs) [a]		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
In-Person Audit						
16-Watt LED	0.723	5,276.94	1.061	7,745.09	147%	147%
5-Watt LED Candelabra	1.264	7,990.75	5.362	39,133.35	424%	490%
5-Watt LED Globe	3.104	21,583.55	5.844	42,651.53	188%	198%
7-Watt LED Track Light	0.145	1,054.76	0.717	5,230.65	496%	496%
9-Watt LED	3.728	27,205.42	10.024	73,157.69	269%	269%
Exterior 9-Watt LED	-	2,156.99	0.000	5,920.94	-	275%
R30 LED	1.250	7,859.57	2.882	21,032.58	231%	268%
Bathroom Aerator	0.357	3,895.55	0.374	3,923.93	105%	101%
Kitchen Aerator	0.454	10,010.43	0.460	10,063.53	101%	101%
Low-Flow Showerhead	3.585	71,630.56	3.520	71,901.38	98%	100%
Programmable Thermostat (Heat Pump)	-	984.78	0.000	984.78	-	100%
Programmable Thermostat (Electric Heat + Central AC)	-	969.20	0.000	969.20	-	100%
Programmable Thermostat (Natural Gas Heat + Central AC)	-	1,709.61	0.000	1,709.61	-	100%
Smart Thermostat with Enrollment (Heat Pump)	-	56,602.39	0.000	62,032.20	-	110%
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	60,755.00	0.000	70,497.14	-	116%
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	40,925.43	0.000	38,469.91	-	94%
Pipe Wrap	0.679	5,114.92	0.575	5,037.68	85%	98%
Water Heater Setback	0.293	2,571.11	0.238	2,083.99	81%	81%
Audit Recommendation	-	54,201.20	0.000	54,201.20	-	100%
Virtual Audit						
16-Watt LED	0.052	379.43	0.087	634.98	167%	167%
5-Watt LED Candelabra	0.381	2,778.26	0.363	2,645.75	95%	95%
5-Watt LED Globe	0.631	4,603.97	0.601	4,384.38	95%	95%
7-Watt LED Track Light	0.057	416.65	0.055	402.44	97%	97%
9-Watt LED	0.307	2,241.42	0.973	7,098.52	316%	317%
Exterior 9-Watt LED	-	240.41	0.000	232.23	-	97%
R30 LED	0.227	1,656.89	0.212	1,544.25	93%	93%
Bathroom Aerator	0.138	1,450.86	0.050	522.31	36%	36%
Kitchen Aerator	0.064	1,412.42	0.039	847.46	60%	60%
Low-Flow Showerhead	0.731	14,922.91	0.321	6,566.09	44%	44%
Smart Power Strip	0.513	2,850.00	0.416	2,308.50	81%	81%
Audit Recommendation	-	11,884.90	0.000	11,884.90	-	100%

Measure	*Ex Ante* Savings (With Embedded ISRs) [a]		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
Weatherization and Add-On Measures						
Air Sealing (Electric Heat + Central AC)	1.253	11,891.60	1.253	11,891.60	100%	100%
Air Sealing (Natural Gas Heat + Central AC)	0.161	439.93	0.161	439.93	100%	100%
Air Sealing (Heat Pump)	0.323	3,782.23	0.323	3,782.23	100%	100%
Duct Sealing (Heat Pump)	0.300	396.93	0.300	396.93	100%	100%
Duct Sealing (Electric Heat)	0.127	636.10	0.000	636.10	0%	100%
Attic Insulation	4.026	25,789.46	6.208	50,821.25	154%	197%
Radiant Barrier	0.379	2,730.11	0.374	2,730.11	99%	100%
Refrigerator Replacement	35.904	249,408.00	35.978	249,408.00	100%	100%
2021 Kits Combined						
11-Watt LED	7.224	52,712.83	18.283	167,904.99	253%	319%
16-Watt LED	12.754	93,022.65	21.291	195,534.04	167%	210%
9-Watt LED	4.678	34,108.30	14.774	135,676.68	316%	398%
LED Night-Light	-	60,177.43	0.000	42,725.98	-	71%
Bathroom Aerator (Electric)	3.743	39,288.85	1.345	14,118.43	36%	36%
Bathroom Aerator (Non-Electric)	10.119	106,225.41	0.000	-	0%	0%
Kitchen Aerator (Electric)	3.002	65,735.98	1.796	39,335.70	60%	60%
Kitchen Aerator (Non-Electric)	8.116	177,730.61	0.000	-	0%	0%
Low-Flow Showerhead (Electric)	6.183	126,278.33	2.713	55,413.31	44%	44%
Low-Flow Showerhead (Non-Electric)	16.717	341,419.18	0.000	-	0%	0%
Smart Power Strip	36.639	203,550.00	29.656	164,754.00	81%	81%
Furnace Whistle (Central AC only)	134.878	381,077.68	29.297	22,051.66	22%	6%
Furnace Whistle (Electric Cooling + Heating)	38.537	108,879.34	8.370	23,649.42	22%	22%
Furnace Whistle (Heating Only)	4.282	12,097.70	0.000	1,927.66	0%	16%
Furnace Whistle (Natural Gas Heat + No Central AC)	36.396	102,830.48	0.000	-	0%	0%
IQW - Direct Install Kit [b]	**62.73**	**171,205.71**		**97,683.34**	**26%**	**57%**
9-Watt LED	-	-	8.432	77,432.73	-	-
LED Night-Light	-	-	0.000	8,248.93	-	-
Bathroom Aerator (Electric)	-	-	0.256	2,685.87	-	-
Bathroom Aerator (Non-Electric)	-	-	0.000	-	-	-
Furnace Whistle (Central AC Only)	-	-	5.730	4,313.13	-	-
Furnace Whistle (Electric Cooling + Heating)	-	-	1.637	4,625.64	-	-
Furnace Whistle (Heating Only)	-	-	0.000	377.04	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	0.000	-	-	-
Total	**447**	**2,798,751**	**222**	**1,836,700**	**52%**	**66%**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] Kit overall *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Table 63 and Table 64 show program *ex ante* reported savings, audited savings, verified savings, and *ex post* gross demand reduction and energy savings, respectively.

Table 63. 2020 IQW Program *Ex Ante* and *Ex Post* Peak Demand Reduction (kW)

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
In-Person Audit				
16-Watt LED	0.723	0.651	0.609	1.061
5-Watt LED Candelabra	1.264	1.228	1.100	5.362
5-Watt LED Globe	3.104	3.179	2.848	5.844
7-Watt LED Track Light	0.145	0.134	0.120	0.717
9-Watt LED	3.728	3.545	3.314	10.024
Exterior 9-Watt LED	-	-	-	-
R30 LED	1.250	1.103	0.988	2.882
Bathroom Aerator	0.357	0.369	0.369	0.374
Kitchen Aerator	0.454	0.456	0.456	0.460
Low-Flow Showerhead	3.585	3.562	3.562	3.520
Programmable Thermostat (Heat Pump)	-	-	-	-
Programmable Thermostat (Electric Heat + Central AC)	-	-	-	-
Programmable Thermostat (Natural Gas Heat + Central AC)	-	-	-	-
Smart Thermostat with Enrollment (Heat Pump)	-	-	-	-
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	-	-	-
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	-	-	-
Pipe Wrap	0.679	0.678	0.678	0.575
Water Heater Setback	0.293	0.293	0.465	0.238
Audit Recommendation	-	-	-	-
Virtual Audit				
16-Watt LED	0.052	0.052	0.044	0.087
5-Watt LED Candelabra	0.381	0.378	0.321	0.363
5-Watt LED Globe	0.631	0.626	0.532	0.601
7-Watt LED Track Light	0.057	0.057	0.049	0.055
9-Watt LED	0.307	0.319	0.271	0.973
Exterior 9-Watt LED	-	-	-	-
R30 LED	0.227	0.226	0.192	0.212
Bathroom Aerator	0.138	0.136	0.049	0.050
Kitchen Aerator	0.064	0.065	0.039	0.039
Low-Flow Showerhead	0.731	0.730	0.321	0.321
Smart Power Strip	0.513	0.513	0.416	0.416
Audit Recommendation	-	-	-	-
Weatherization and Add-On Measures				
Air Sealing (Electric Heat + Central AC)	1.253	1.253	1.253	1.253
Air Sealing (Natural Gas Heat + Central AC)	0.161	0.161	0.161	0.161
Air Sealing (Heat Pump)	0.323	0.323	0.323	0.323
Duct Sealing (Heat Pump)	0.300	0.300	0.300	0.300
Duct Sealing (Electric Heat)	0.127	0.127	0.127	-
Attic Insulation	4.026	4.026	4.026	6.208
Radiant Barrier	0.379	0.379	0.379	0.374
Refrigerator Replacement	35.904	35.904	35.904	35.978

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
2021 Kits Combined				
11-Watt LED	7.224	7.061	7.231	18.283
16-Watt LED	12.754	12.798	13.082	21.291
9-Watt LED	4.678	4.854	4.962	14.774
LED Night-Light	-	-	-	9.843
Bathroom Aerator (Electric)	3.743	3.694	1.327	1.345
Bathroom Aerator (Non-Electric)	10.119	9.987	-	-
Kitchen Aerator (Electric)	3.002	3.016	1.805	1.796
Kitchen Aerator (Non-Electric)	8.116	8.154	-	-
Low-Flow Showerhead (Electric)	6.183	6.181	2.712	2.713
Low-Flow Showerhead (Non-Electric)	16.717	16.711	-	-
Smart Power Strip	36.639	36.639	29.656	29.656
Furnace Whistle (Central AC only)	134.878	134.809	29.297	29.297
Furnace Whistle (Electric Cooling + Heating)	38.537	38.517	8.370	8.370
Furnace Whistle (Heating Only)	4.282	4.280	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	36.396	36.377	-	-
IQW - Direct Install Kit [b]	**62.73**	**46.86**	**10.294**	**16.055**
9-Watt LED	-	-	2.671	8.432
LED Night-Light	-	-	-	-
Bathroom Aerator (Electric)	-	-	0.256	0.256
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC Only)	-	-	5.730	5.730
Furnace Whistle (Electric Cooling + Heating)	-	-	1.637	1.637
Furnace Whistle (Heating Only)	-	-	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	-	-
Total	**447**	**431**	**168**	**232**

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] Kit overall *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Table 64. 2020 IQW Program *Ex Ante* and *Ex Post* Electric Energy Savings (kWh)

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
In-Person Audit				
16-Watt LED	5,276.94	4,726.26	4,418.03	7,745.09
5-Watt LED Candelabra	7,990.75	8,104.80	7,260.55	39,133.35
5-Watt LED Globe	21,583.55	21,615.16	19,363.58	42,651.53
7-Watt LED Track Light	1,054.76	940.21	842.27	5,230.65
9-Watt LED	27,205.42	25,788.42	24,106.57	73,157.69
Exterior 9-Watt LED	2,156.99	2,139.48	1,999.95	5,920.94
R30 LED	7,859.57	7,381.50	6,612.59	21,032.58
Bathroom Aerator	3,895.55	3,919.86	3,919.86	3,923.93
Kitchen Aerator	10,010.43	10,047.96	10,047.96	10,063.53
Low-Flow Showerhead	71,630.56	71,764.12	71,764.12	71,901.38
Programmable Thermostat (Heat Pump)	984.78	984.78	984.78	984.78

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Programmable Thermostat (Electric Heat + Central AC)	969.20	969.20	969.20	969.20
Programmable Thermostat (Natural Gas Heat + Central AC)	1,709.61	1,709.61	1,709.61	1,709.61
Smart Thermostat with Enrollment (Heat Pump)	56,602.39	56,602.00	53,205.88	62,032.20
Smart Thermostat with Enrollment (Electric Heat + Central AC)	60,755.00	60,755.10	57,109.79	70,497.14
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	40,925.43	40,924.63	38,469.15	38,469.91
Pipe Wrap	5,114.92	5,103.08	5,103.08	5,037.68
Water Heater Setback	2,571.11	2,571.11	4,078.23	2,083.99
Audit Recommendation	54,201.20	54,201.20	54,201.20	54,201.20
Virtual Audit				
16-Watt LED	379.43	379.43	322.51	634.98
5-Watt LED Candelabra	2,778.26	2,778.26	2,361.52	2,645.75
5-Watt LED Globe	4,603.97	4,603.97	3,913.37	4,384.38
7-Watt LED Track Light	416.65	416.64	354.15	402.44
9-Watt LED	2,241.42	2,241.44	1,905.22	7,098.52
Exterior 9-Watt LED	240.41	240.41	204.35	232.23
R30 LED	1,656.89	1,656.89	1,408.36	1,544.25
Bathroom Aerator	1,450.86	1,450.86	522.31	522.31
Kitchen Aerator	1,412.42	1,412.42	847.45	847.46
Low-Flow Showerhead	14,922.91	14,922.91	6,566.08	6,566.09
Smart Power Strip	2,850.00	2,850.00	2,308.50	2,308.50
Audit Recommendation	11,884.90	11,884.90	11,884.90	11,884.90
Weatherization and Add-On Measures				
Air Sealing (Electric Heat + Central AC)	11,891.60	11,891.60	11,891.60	11,891.60
Air Sealing (Natural Gas Heat + Central AC)	439.93	439.93	439.93	439.93
Air Sealing (Heat Pump)	3,782.23	3,782.23	3,782.23	3,782.23
Duct Sealing (Heat Pump)	396.93	396.93	396.93	396.93
Duct Sealing (Electric Heat)	636.10	636.10	636.10	636.10
Attic Insulation	25,789.46	25,789.46	25,789.46	50,821.25
Radiant Barrier	2,730.11	2,730.11	2,730.11	2,730.11
Refrigerator Replacement	249,408.00	249,408.00	249,408.00	249,408.00
2021 Kits Combined				
11-Watt LED	52,712.83	52,712.84	53,983.03	167,904.99
16-Watt LED	93,022.65	93,022.51	95,091.32	195,534.04
9-Watt LED	34,108.30	34,108.52	34,867.09	135,676.68
LED Night-Light	60,177.43	60,177.43	42,725.98	42,725.98
Bathroom Aerator (Electric)	39,288.85	39,288.85	14,118.35	14,118.43
Bathroom Aerator (Non-Electric)	106,225.41	106,225.41	-	-
Kitchen Aerator (Electric)	65,735.98	65,735.98	39,335.66	39,335.70
Kitchen Aerator (Non-Electric)	177,730.61	177,730.61	-	-
Low-Flow Showerhead (Electric)	126,278.33	126,278.33	55,413.23	55,413.31
Low-Flow Showerhead (Non-Electric)	341,419.18	341,419.18	-	-
Smart Power Strip	203,550.00	203,550.00	164,754.00	164,754.00

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Furnace Whistle (Central AC only)	381,077.676	381,077.676	22,051.66	22,051.66
Furnace Whistle (Electric Cooling + Heating)	108,879.336	108,879.336	23,649.42	23,649.42
Furnace Whistle (Heating Only)	12,097.704	12,097.704	1,927.66	1,927.66
Furnace Whistle (Natural Gas Heat + No Central AC)	102,830.484	102,830.484	-	-
IQW - Direct Install Kit [b]	**171,205.71**	**178,425.84**	**40,149.77**	**97,683.34**
9-Watt LED	-	-	19,899.15	77,432.73
LED Night-Light	-	-	8,248.93	8,248.93
Bathroom Aerator (Electric)	-	-	2,685.87	2,685.87
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC Only)	-	-	4,313.13	4,313.13
Furnace Whistle (Electric Cooling + Heating)	-	-	4,625.64	4,625.64
Furnace Whistle (Heating Only)	-	-	377.04	377.04
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	-	-
Total	**2,798,751**	**2,803,722**	**1,281,907**	**1,836,700**

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] Kit overall *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Ex Post Net Savings

The *ex post* net savings are attributed to the program after adjusting for freeridership and spillover by applying the NTG value. Because IQW is an income-qualified program, the evaluation team used an industry-standard assumption that, absent the program, participants would not have purchased and installed the measures provided because of financial constraints. Therefore, the NTG was 100%, where both freeridership and spillover equal 0%.

With a 100% NTG, the *ex post* net savings were identical to the *ex post* gross savings.

Process Evaluation

For the process evaluation, the evaluation team interviewed IPL and CLEAResult staff, assessed customer satisfaction with the program, reviewed program tracking data, and reviewed program marketing materials including the program website and an assessment report.

Changes to Program Design

IPL made several program changes during 2020, including both planned changes and changes due to the COVID-19 pandemic:

- ***Addition of three kit options.*** IPL launched these new kits in March 2020 to provide customers with a more robust offering and different kit choices. This was originally part of the 2020 plan.
- ***Addition of a virtual assessment option.*** IPL was already planning to add virtual assessments to the 2021 program. In March 2020, IPL ceased Home Energy Assessments and all in-home program activities due to COVID-19, then launched virtual assessments as a formal program offering in June 2020.

- ***Addition of custom kits.*** Corresponding with the launch of virtual assessments in June 2020, IPL added custom kits to replace the typical direct install measures previously installed by the Energy Advisor during a Home Energy Assessment. During the virtual assessment, the Energy Advisor notes what measures the home could use and what measures they already received in their initial kit. The Energy Advisor then creates and sends a custom kit to the customer for self-install.
- ***Addition of direct ship smart thermostats.*** In June 2020, through the Demand Response program, IPL added direct shipping for smart thermostats to the IQW program. IPL program staff report that CLEAResult worked with Ecobee to have these smart thermostats directly shipped to customers and pre-enrolled in the CoolCents program. Program staff report that the IQW program claims savings associated with the thermostat installation and the Demand Response program claims savings for event-based demand reductions.

2020 Program Highlights

IPL and CLEAResult reported several highlights from the 2020 program year:

- ***Focused direct mail promotions.*** Understanding that customers may be responding less to emails over time, IPL and CLEAResult also promoted the new virtual offerings via direct mail and they conducted a call campaign. They achieved 1,200 bookings in total; program staff report that, in order of success, the biggest achiever was the call campaign, followed by the postcard. Online digital ads also performed well compared previous digital campaigns, and the paid search click-through rate was 22%.
- ***Virtual assessment successes.*** Since IPL was already planning for virtual assessments in 2021, it was able to speed up implementation and begin this offering in June 2020. In addition, customer survey results demonstrate high satisfaction with the virtual assessment offering.
- ***Kit promotions.*** During the COVID-19 shutdown, IPL was able to continue to promote kits online and to diversify the types of kits available.
- ***Reach-back marketing campaign.*** Once the virtual assessments launched, IPL conducted a reach-back marketing campaign to customers who had previously expressed interest in a Home Energy Assessment. IPL and CLEAResult then worked with those customers to encourage them to take advantage of the virtual assessment offering in place of a Home Energy Assessment.
- ***Contractor network growth.*** The contractor network grew in 2020 to almost 80 total contractors. Program staff reported that they added support for contractors, including marketing pieces for them to use, contractor newsletters, and direct engagement with the program team. IPL also plans to conduct virtual contractor webinars, beginning in early 2021.

2020 Program Challenges

IPL and CLEAResult also noted 2020 program challenges, some of which they are already addressing as part of the 2021 program implementation:

- ***Cancellations.*** When initially launched, there was an uptick in cancellations and no shows for virtual assessments. IPL discovered that many people did not actually understand that it was to be conducted *virtually*, and thought that program staff would be coming to their home, which

they did not want during the COVID-19 pandemic. By adjusting customer messaging, the cancellations were reduced.

- ***Virtual assessment visit preparations.*** Customers need to prepare several items in advance of the virtual assessment, which program staff said was challenging to communicate and achieve. For example, customers need to fully charge their phone battery and have certain items handy, such as a flashlight and screwdriver. Although CLEAResult communicates these preparatory items to the customer prior to the assessment, it can still be difficult to help customers get fully prepared to successfully complete the virtual assessment. In addition, it may be difficult for some customers to virtually show the Energy Advisor spaces in their home that are difficult to access, such as the attic.
- ***Smart thermostat installation.*** IPL drop-ships thermostats to IQW program participants in coordination with the Demand Response program. Program staff reported that they have not been able to determine whether customers have difficulty installing the devices, though they would like to see higher installation rates earlier on. In order to help improve the installation rate, CLEAResult began helping customers to install their smart thermostat during the virtual assessment.
- ***Deferrals.*** Similar to 2019, program staff reported that in 2020 deferrals continued to be one of their largest challenges. When CLEAResult completes an eScore Home Energy Assessment, they conduct a health and safety check, which includes carbon monoxide monitoring, ensuring that the furnace is functioning properly, and inspecting for mold, asbestos, and pests. If a customer home does not pass the health and safety check, it is deferred from the program; that is, CLEAResult gives the customer information about organizations that can help them remedy their health and safety issues. Most customers who are deferred do not come back into the IPL program for subsequent Phase 2 or Phase 3 visits. To help overcome this challenge, in 2019 CLEAResult started to pass all deferrals to the Indiana Community Action Agency, which has funding to help customers remedy their health and safety issues. Program staff noted that in 2020, with the suspension of in-person work, this relationship with the Indiana Community Action Agency has dwindled.

Participant Feedback

As part of the IQW participant survey, the evaluation team asked limited satisfaction questions related to the in-home and virtual assessments, in an attempt to discern any key satisfaction differences in assessment delivery mode.

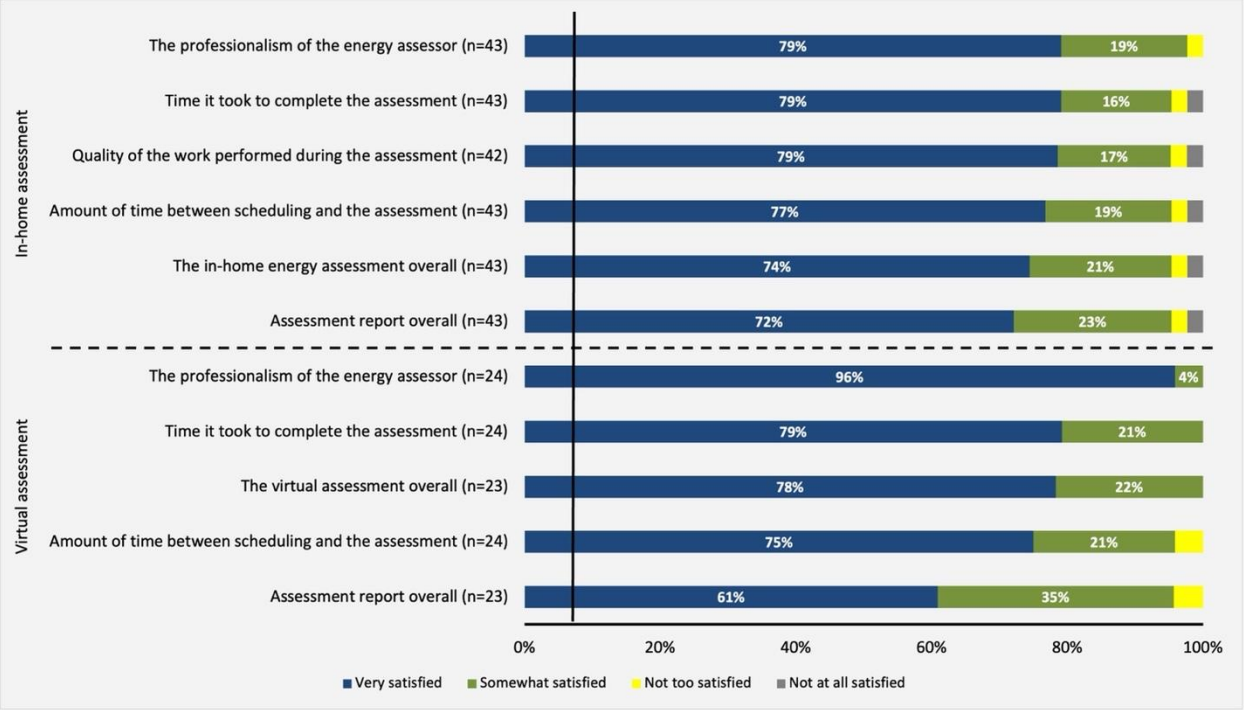
Satisfaction with several assessment components were relatively high and similar across participants who received the in-home versus virtual assessments (as shown in Figure 41):

- ***Time it took to complete the energy assessment:*** 79% of both the in-home and virtual assessment participants expressed high satisfaction ratings.
- ***Amount of time between scheduling and the assessment:*** 77% and 75% of in-home and virtual assessment participants, respectively, expressed high satisfaction ratings.
- ***Assessment overall:*** 74% and 78% of in-home and virtual assessment participants, respectively, expressed high satisfaction ratings.

There are two areas with satisfaction differences between in-home and virtual assessment participants:

- ***Professionalism of their Energy Advisor:*** 96% and 79% of virtual and in-home assessment participants, respectively, expressed high satisfaction ratings (this difference is statistically significant).
- ***Assessment report overall:*** 72% and 61% of in-home and virtual assessment participants, respectively, expressed high satisfaction ratings (this difference is *not* statistically significant).

Figure 41. 2020 IQW Program Participant Satisfaction with In-Home and Virtual Assessments



Participant Demographics

Table 65 details the demographic characteristics for all IQW participants who responded to the survey.

Table 65. 2020 IQW Program Participant Demographics

Demographics	Kit-Only Respondents (n=63)	Audit Respondents (n=89)
Homeownership Status		
Own	81%	97%
Rent	19%	3%
Type of Residence		
Single-family detached	92%	90%
Multifamily apartment or condo (four or more units)	3%	7%
Attached house (townhouse, rowhouse)	5%	1%
Other	0%	2%
Number of People in Home		
One	25%	40%
Two	52%	22%
Three	13%	13%
Four	6%	13%
Five or more	4%	12%
Annual Household Income		
Under $25,000	24%	26%
$25,000 to under $35,000	21%	22%
$35,000 to under $50,000	22%	19%
$50,000 to under $75,000	13%	10%
$75,000 to under $100,000	6%	5%
$100,000 to under $150,000	0%	1%
Over $150,000	0%	0%
Prefer not to say	14%	17%

Follow-Up on 2019 Evaluation Recommendations

The evaluation team gathered information from IPL and CLEAResult and reviewed program documentation to follow up on recommendations made during the 2019 evaluation; the status of each is shown in Table 66.

Table 66. IQW Program 2019 Recommendation Status

2019 Recommendation	Status
For deemed savings values, clearly document the correct per-unit savings across all sources and update this document as any changes are made. Savings values varied between documentation and the participation data, making it unclear which *ex ante* savings value should be referenced.	***Completed.*** CLEAResult documented per-unit savings in measure savings protocol templates and provided these templates to IPL in May 2020.
From an evaluability perspective, consistently apply installation rates to per-unit measure assumptions. Going forward, use the updated *ex post* savings values and apply the per-measure installation rates developed in this 2019 evaluation for the next program cycle.	***In progress.*** CLEAResult will apply *ex post* savings to the 2021 program design. In mid-2020 CLEAResult launched a new approach to have the engineering team own the measure modification process to ensure alignment with source documents (such as Indiana TRM (v2.2) values or evaluation reports) and safeguard against gaps in measure configurations.

2019 Recommendation	Status
Troubleshoot or conduct quality control of data entry for key specifications, including efficiency levels, home fuel types, and other details. For example, only allow certain options once a measure is selected (so, if a smart thermostat with a central AC is selected, only allow that option for the cooling source). If there are unique situations, such as dual cooling sources, add a notes field to allow technicians to document what is in the home, which will further assist with quality control efforts. Provide all tracked data to the evaluation team, as available, to inform the *ex post* analysis.	***In progress.*** CLEAResult noted that the energy advisors, who choose heating and cooling types in the field tool, are trained how to select the correct heating and cooling types. CLEAResult will continue to perform these trainings to ensure that heating and cooling types are captured correctly. There were data entry improvements in 2020, but there were also a number of cases where the home fuel types (water, heating, and cooling) did not align with the measures installed.
If exceptions are allowed, include language and rationale for such exceptions in the next operating plan. Develop data tracking metrics that can be used for verification when program limits are exceeded.	***In progress.*** CLEAResult aims to maximize the installations within each home to 50 bulbs, two showerheads, three bathroom aerators, and one kitchen aerator. However, these limits are not mentioned in the *2020 Operating Plan*, nor are there details about measure limits for kits and other direct install measures.
Ensure that tracking data contain a single line with the total quantity by measure to reduce the uncertainness related to duplicate data.	***Not completed.*** The tracking data continue to contain multiple line items by home and measure, sometimes making it appear as though these measures are duplicates. The evaluation team was able to identify duplicate entries based on MLI numbers. Program staff report that additional detail attached to each unique MLI number is provided to IPL to signal valid entries (such information is not contained within the tracking data).
Limit kits to customers who have not yet received an assessment or consider a smaller post-assessment kit to maximize the savings potential for kit measures. Customers who receive an assessment will have limited opportunity to achieve additional savings from the LED and bathroom and kitchen aerator kit measures.	***Not completed.*** Program staff considered this recommendation, but additional tracking items would be needed to implement this; instead, they will streamline processes and maintain goodwill and satisfaction for customers by providing the kits to any customers. This does limit the savings potential from kits supplied to customers subsequent to audits, as there may not be adequate eligible locations to install kit items, depending on what was installed during the audit.
Provide information on whether a customer has received a kit so that energy advisors can offer to install any kit measures that have not yet been installed to reduce waste and maximize energy savings.	***Completed.*** Energy Advisors receive information regarding if a customer has received a kit. This also allows the Energy Advisors to determine the best custom kit for customers following their assessment.

Conclusions and Recommendations

CONCLUSION 1: In 2020, energy-savings and demand reduction realization rates declined from 2019 levels, achieving 66% and 50%, respectively. In large part, this is because the COVID-19 pandemic prevented in-person activities from March through December and impacted CLEAResult's ability to safely deliver the core program offerings (in-person audits with direct install measures and the opportunity for add-on measures). The program reliance on energy-saving kits led to more evaluation adjustments due to inconsistent and incomplete data collection.

In 2020, IPL achieved 1,836,700 kWh of *ex post* net energy savings and 222 kW of *ex post* net demand reduction, achieving 47% of the energy-savings goal and 42% of the demand reduction goal. This is lower than in 2019, when IPL achieved 109% of its energy-savings goal and 78% of its demand reduction goal. This is likely the result of the COVID-19 pandemic, which prevented CLEAResult from administering the in-person program components that typically provide the majority of overall savings.

The overall program realization rates were lower than 100% because of adjustments the evaluation team made to the kit savings components, outlined below. These adjustments are consistent with the approach used in both the 2018 and 2019 evaluations. However, the impact of these adjustments was greater in 2020 since the energy-saving kits contributed over half (54%) of program savings compared to just 10% of program savings in 2019.

- ***HVAC system information was not tracked for customers who received furnace whistles.*** The team applied different *ex post* savings values to furnace whistles to reflect the participants' cooling and heating system fuel types. The evaluation team assigned demand reduction only to the portion of customers with central AC. This approach is consistent with prior evaluation years.
- ***Water heating fuel was not tracked for customers who received water savings measures in their energy-saving kit.*** The evaluation team made savings adjustments to bathroom and kitchen faucet aerators and low-flow showerheads in cases where energy-saving kits were sent to homes with non-electric water heating. This approach is consistent with prior evaluation years.
- ***Some customer received multiple prescriptive kits and, as a result, received multiple furnace whistles that were not able to install.*** The evaluation team assumed that there might be eligible sockets and fixtures to install multiple LEDs and multiple water saving devices sent in the energy-saving kits; however, there is typically only one furnace per household where a furnace whistle can be installed. Accordingly, the evaluation team credited the program with a maximum of one furnace whistle per household[26] and removed the duplicates.

These approaches are detailed in the *Overall Verified Measure Quantity* section.

[26] The evaluation team defined a household as a record with a unique premise ID in the program tracking data.

One notable factor that resulted in a higher realization rate for energy-savings (67%) compared to demand reduction (52%) was related to the lighting measures, specifically:

- ***Different baseline wattages were used in the ex ante and ex post savings calculations.*** Lighting measures contributed to the increase in energy savings from *ex ante* to *ex post* gross. CLEAResult used lower baseline wattages in 2020 than in 2019, while the evaluation team used the same baseline wattages in both years. CLEAResult likely used lower baseline wattages in anticipation of the EISA backstop. However, since the EISA backstop was not implemented (and halogen bulbs were still available), the evaluation team still factored halogen bulbs into the baseline wattages for the *ex post* savings values.

RECOMMENDATIONS

For the energy-saving kits, identify and implement a solution that addresses the issues caused by water heating fuel type and HVAC system fuel type not being tracked for kit recipients. For example, this could be asked during the eScore survey, where the questionnaire provides information to help customers identify their systems. For example:

- Natural gas water heaters typically have a big flue on top that vents outside (show image).
- Natural gas heating systems can cause higher gas bills in the winter than in the summer.

Monitor the number of kits sent to each customer and ensure that they only receive a reasonable number of measures (such as one furnace whistle per household). If a customer receives one kit and then returns to the program for more energy-saving opportunities, direct them to an in-person or virtual audit so that an energy advisor can ensure that customer only receives measures for which they are eligible, or clarify whether they are eligible for the MFDI program.

Coordinate with evaluation team regarding the appropriate lighting baseline to use for LEDs distributed through kits. Due to the fast-changing lighting market, a new baseline may be appropriate.

CONCLUSION 2: Customers appear very satisfied with the new virtual assessment offering that was piloted during 2020 in response to the COVID-19 pandemic.

Customer survey results demonstrate that in-home and virtual participants are nearly equally satisfied with the amount of time it took to complete their energy assessment, the amount of time between scheduling and the assessment, and the assessment overall. Virtual assessment participants were more satisfied than in-home participants with the professionalism of their Energy Advisor; this difference is statistically significant.

RECOMMENDATION

Continue to offer virtual assessments and monitor participant satisfaction with this offering. If in-home assessments will be provided again in the future, explore why virtual assessment participants are more satisfied than in-home assessment participants with the professionalism of their Energy Advisor. This could help inform whether additional contractor training is needed to enhance in-home participant satisfaction.

Lighting and Appliances Program

IPL introduced the Lighting and Appliances program in 2018 as an expanded offering to its residential upstream lighting rebates. The Lighting and Appliances program combines savings for three program components: upstream lighting rebate, downstream appliance rebate, and an online IPL Marketplace with instant rebates. Through a shift toward specialty lighting and the addition of several new measures, the program has continued to diversify its offerings. The program achieved 248% of its net energy-savings goal and 111% of its net demand reduction goal.

In 2020, the program saw savings shifting from the upstream component to the IPL Marketplace as shown in Table 67. In 2018 and 2019, upstream lighting made up greater than 97% of total program ex post net savings while IPL marketplace made up only about 2%. In 2020, the IPL Marketplace share increased to almost 15%.

Table 67. Lighting and Appliance Program Energy Savings by Program Component

Program Component	2018	2019	2020
Upstream Lighting	97.8%	97.3%	82.9%
Appliance Rebate	0.6%	0.4%	2.2%
IPL Marketplace	1.6%	2.3%	14.9%
Total Ex Post Net kWh	**20,125,603**	**24,880,363**	**7,723,798**

Program Description

IPL designed the Lighting and Appliances program to increase awareness and sales of energy-efficient lighting and appliance products within IPL's service territory and to offer multiple channels for customers to purchase energy-efficient products. IPL also offers an online store, the IPL Marketplace.

Upstream Lighting

Through the Lighting and Appliances program, IPL offers discounts on standard and specialty LEDs across a wide range of applications, package sizes, and wattages. Participating retailers span a variety of channel types, including big-box, home improvement, club, discount, and hardware stores. CLEAResult implements the program, providing point-of-purchase materials and in-store training and conducting retail events.

Appliance Rebate

IPL offers rebates to its customers who purchase a qualified air purifier, dehumidifier, or smart thermostat from any retailer, including online stores other than the IPL Marketplace. IPL added new measures to the appliance rebate offerings in 2020, including washers, dryers, pool pumps, televisions, and room ACs. Customers access the eScore portal to submit an online rebate application for qualifying appliance purchases. IPL introduced the eScore portal in 2018 as a personalized profile that lets customers know how to be more energy efficient. Customers can see information, like tips to save money on energy bills, and can access features that enable them to participate in IPL's residential energy efficiency programs. The only mode of applying for an IPL appliance rebate is to complete the online appliance rebate application in the eScore portal. CLEAResult implements the appliance rebate program component.

IPL Marketplace

IPL Marketplace is an online store, implemented by Uplight, that sells energy-saving products to residential customers within IPL's service territory. Customers receive instant discounts for online purchases of qualifying LED lighting, smart thermostats, smart power strips, electric hot water heaters, air purifiers, and dehumidifiers. IPL added air purifiers and dehumidifiers to the IPL Marketplace in 2020.

The IPL Marketplace also sells products that are not eligible for IPL rebates; this practice aligns with other similar marketplace programs and can increase customer satisfaction and drive web traffic to the IPL Marketplace. For example, the presence of non-rebated items can cause the IPL Marketplace to rank higher in Google searches than it would with only rebate-eligible products. Non-rebated items in 2020 included some types of LED lighting, air filters, smart strips, EV chargers, connected home devices, and water-saving products (including faucet aerators, low-flow showerheads, thermostatic shower restriction valves, and smart sprinkler controllers).

Research Objectives

The evaluation team sought to assess the overall program savings, understand the new program component processes, determine overall successes and challenges of the retail channels, and identify any areas for improvement. We had several research objectives:

- Determine gross and net energy savings and demand reduction for the 2020 program, including for energy-efficient lamps that will not be installed until future years
- Estimate the NTG and installation rate for appliance rebate and IPL Marketplace purchases
- Assess customer satisfaction with IPL overall
- Identify opportunities for program improvement

Research Approach

To address the research objectives, the evaluation team conducted several activities:

- Interviewed IPL, Uplight, and CLEAResult program staff about program operations, marketing, and program successes and challenges
- Conducted an engineering review of savings assumptions
- Applied 2019 NTG values for upstream lighting component measures
- Estimated NTG values using participant surveys for non-upstream lighting measures
- Calculated ISR using the UMP approach for lighting measures and participant surveys for non-lighting measures
- Reviewed program promotional and operations materials
- Surveyed IPL Marketplace and appliance rebate participants about their experience

Program Performance

Despite the disruption to in-store retail sales at the onset of the COVID-19 pandemic, the strong sales in home improvement and through online vendors helped the Lighting and Appliances program run

smoothly in 2020. Upstream lighting measures comprised 83% of *ex post* net savings, and the introduction of new measure offerings diversified the program's savings opportunities. The program sold 413,179 light bulbs and fixtures and rebated 3,985 appliances, achieving 7,723,798 kWh in net energy savings and 994 kW in net demand reduction, as shown in Table 68.

Table 68. 2020 Lighting and Appliances Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	3,116,688	7,723,798	248%
Demand Reduction (kW)	897	994	111%
Participation (measures)	434,320	417,164	96%
Budget	$2,551,607	$1,536,914	60%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

IPL achieved 248% of the program net energy-savings goal and 111% of the demand reduction goal, while spending 60% of its planned budget. Table 69 provides a summary of savings at each step of program evaluation.

Table 69. 2020 Lighting and Appliances Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	6,134,065	6,011,944	5,045,655	15,414,378	7,723,798
Demand Reduction (kW)	1,236.72	1,723.07	1,486.28	2,060.28	993.99

For *ex ante* calculations, CLEAResult used the post-2020 EISA requirements to establish baseline wattage; however, the 2020 backstop portion of EISA has not yet been implemented and halogen lamps continue to be available in the market.[27] The evaluation team therefore followed the UMP-recommended ENERGY STAR lumens binning approach, using halogen lamps as the baseline to determine wattage savings for each program lamp, consistent with previous evaluation years. The team will continue to use halogen lamps as the baseline until EISA is either fully instated or the U.S. Department of Energy determines new rules. This difference in calculation resulted in substantially higher *ex post* per-unit savings for most lamps.

Table 70 includes a breakout of *ex post* gross and net savings, including savings attributed to carryover lighting savings. Table 71 provides a component-level summary of NTG values applied to program measures.

[27] Pending the resolution of several rulemaking processes and lawsuits, the backstop was not enforced by the Trump administration U.S. Department of Energy.

Table 70. 2020 Lighting and Appliances Program *Ex Post Net* Savings and Net Reduction

Metric	Program Component	*Ex Post* Net		
		2020	Carryover	Total
Energy Savings (kWh)	Upstream Lighting	5,804,708	596,621	6,401,329
	Appliance Rebate	171,147	n/a	171,147
	IPL Marketplace	1,093,270	58,052	1,151,322
	Total	**7,069,125**	**654,673**	**7,723,798**
Demand Reduction (kW)	Upstream Lighting	796.09	81.80	877.90
	Appliance Rebate	45.84	n/a	45.84
	IPL Marketplace	62.30	7.95	70.25
	Total	**904.23**	**89.76**	**993.99**

Note: Values rounded for reporting purposes.

Table 71. 2020 Lighting and Appliances Program Realization Rates and Net-to-Gross Summary

Gross Realization Rate		Program Component	Freeridership	Spillover	NTG
kWh	kW				
274%	182%	Upstream Lighting	54%	N/A	46%
		Appliance Rebate	39%	3%	64%
		IPL Marketplace – Smart Thermostats	14%	13%	99%
		IPL Marketplace – Power Strips	18%	0%	82%
		IPL Marketplace - Lighting	22%	3%	81%
		Total Program [a]	**N/A**	**N/A**	**50%**

[a] The team weighted total savings by program component *ex post* gross population savings.

Impact Evaluation

The evaluation team assessed savings for each program component separately due to the varied delivery methods.

Upstream Lighting

The following sections summarize various steps the evaluation team took to determine upstream lighting audited, verified, *ex post* gross, and *ex post* net savings for lamps.

Audited Savings

To determine audited program energy savings and demand reduction for upstream lighting, the evaluation team reviewed the program tracking database and checked savings estimates and calculations against *ex ante* savings assumptions. We were able to confirm accurate application of the assumptions: CLEAResult consistently applied fixed per-unit values of 8.3 kWh per general service lamp, 9.8 kWh per specialty lamp, and 13.8 kWh per reflector. All lamps, regardless of type, should also have received savings of 0.004 kW per lamp for the 2020 program year; however, specialty lamps had no reported *ex ante* kilowatt savings.

The evaluation team audited bulb quantities and confirmed consistency by comparing bulb descriptions, numbers of packs, and numbers of units against data provided in the tracking database. The team validated bulb quantities through an analysis of rebate and buy-down dollar amounts. Table 72 shows audited savings totals by product type. The team matched bulb SKUs to the ENERGY STAR–certified products list and found that some lamps were miscategorized in the tracking data (such as a reflector being labeled as specialty or a three-way being labeled as standard). This led to differences between *ex ante* and audited savings by bulb type and a small decrease in overall energy savings. The audited demand reduction is much higher than the *ex ante* demand reduction because the evaluation team applied the deemed 0.004 kW per specialty lamp.

Table 72. 2020 Upstream Lighting *Ex Ante* and Audited Savings by Product Type

Product Type	Energy Savings (kWh)		Demand Reduction (kW)	
	Ex Ante	Audited	*Ex Ante*	Audited
Standard LEDs	917,936	907,121	445.06	439.82
Specialty LEDs	1,243,554	1,477,145	0.00	606.01
Reflector LEDs	2,116,284	1,804,435	614.75	524.16
Total	**4,277,774**	**4,188,700**	**1,059.81**	**1,569.99**

Note: Values rounded for reporting purposes.

Verified Savings

The evaluation team applied first-year installation rates, derived through the last statewide lighting study[28] to calculate verified energy savings and demand reduction. The market effects study included 240 residential home visits across Indiana, along with a detailed inventory of lighting products in sockets and in storage. The upstream lighting ISR aligns with other LED studies in other parts of the country.[29]

For this study, the evaluation team used the installation rate of 86% from the Indiana statewide sample. Table 73 summarizes installation rates used by the team for each product type.

Table 73. 2020 Upstream Lighting First-Year Installation Rates by Product Type

Product Type	Installation Rate	Relative Precision (at 90% confidence)
Standard LEDs	86%	±7.6%
Specialty LEDs	86%	±7.6%
Reflector LEDs	86%	±7.6%

Table 74 shows verified energy savings and demand reduction by product type.

[28] Opinion Dynamics. 2015. *2014 Market Effects Study.*

[29] Comparable research in Maryland (86% ISR, 2017) and Illinois (79% ISR, 2017) align with this value.

Table 74. 2020 Upstream Lighting Verified Energy Savings by Product Type

Product Type	Energy Savings (kWh)		Demand Reduction (kW)	
	Audited	Verified	Audited	Verified
Standard LEDs	907,121	780,124	439.82	378.24
Specialty LEDs	1,477,145	1,270,344	606.01	521.17
Reflector LEDs	1,804,435	1,551,814	524.16	450.78
Total	**4,188,700**	**3,602,282**	**1,569.99**	**1,350.19**

Note: Values rounded for reporting purposes.

Ex Post Gross Savings

The evaluation team determined the program *ex post* gross energy savings and demand reduction through an engineering analysis. The team took several steps to determine per-unit *ex post* gross savings for LED lamps (offered through upstream lighting and the IPL Marketplace):

- Identified and applied delta watts using the UMP-recommended lumens binning approach and using ENERGY STAR baseline watts
- Applied Indiana-based AOH
- Applied Indianapolis-based waste heat factors (WHFs)
- Applied Indiana-based coincidence factors
- Applied first year and adjusted lifetime installation rates to account for first-year and carryover savings

The evaluation team relied on a range of data sources. *Appendix H* contains the detailed equations the evaluation team used to calculate 2020 energy savings and demand reduction for the program and provides summary tables of savings assumptions and their sources.

For LED lamps discounted through the program, the evaluation team applied a first-year installation rate of 86%. To determine carryover savings, the team used the UMP-recommended "Discount Future Savings" method, which indicated that most bulbs placed in storage (up to 97%) were installed within four years (including the initial program year), with 24% of the bulbs leftover from Year 1 being installed in Year 2, 24% being installed in Year 3, and so on, until lifetime savings are achieved in Year 4. Given the expected baseline lighting changes in the next few years, the evaluation team decided not to extend general service lamp baseline savings beyond 2023. Therefore, the team applied an adjusted lifetime ISR of 92% to standard LEDs (ending savings in 2023) and a 96% ISR to specialty and reflector lamps, thus accounting for carryover savings as lamps are installed in future years. *Appendix H* describes the team's methodology and assumptions to calculate carryover savings in greater detail.

Table 75 and Table 76 summarize *ex post* energy savings and demand reduction by product type, respectively, compared to *ex ante* and verified savings assumptions. The tables also contain program realization rates, calculated by dividing *ex post* values by *ex ante* values. As shown in the tables, the program achieved a 293% realization rate for energy savings and 162% realization rate for demand

reduction without carryover savings. Realization rates varied across product types, with reflector LEDs achieving the lowest realization rates and specialty LEDs achieving the highest realization rates.

Variance in realization rates are largely a product of how the evaluation team's calculation of *ex post* savings differed from CLEAResult's calculation of *ex ante* savings. To determine *ex ante* savings, CLEAResult multiplied the quantity of all program lamps against a fixed per-unit kilowatt-hour and kilowatt values determined using the post-2020 EISA requirements to establish baseline wattage. To determine *ex post* savings, the evaluation team used the UMP-recommended ENERGY STAR lumens binning approach to determine replacement baseline wattages for each program lamp using the pre-2020 EISA wattages. This difference in calculation, as well as the evaluation team accounting for carryover savings in future years, resulted in substantially higher *ex post* per-unit energy savings for most lamps.

Table 75. 2020 Upstream Lighting *Ex Post* Energy Savings by Product Type

Product Type	Energy Savings (kWh)			Carryover	Realization Rate
	Ex Ante	Verified	*Ex Post*		
Standard LEDs	917,936	789,425	2,716,790	189,544	296%
Specialty LEDs	1,243,554	1,069,456	4,287,513	498,548	345%
Reflector LEDs	2,116,284	1,820,004	5,535,652	643,680	262%
Subtotal	**4,277,774**	**3,678,886**	**12,539,955**	**1,331,772**	**293%**
Program Total				**13,871,726**	**324%**

Note: Values rounded for reporting purposes.

Realization rates for demand are different than those for energy because there is only one *ex ante* deemed kilowatt value for all lamp types (as opposed to separate kilowatt-hour values for each category). Additionally, there were no *ex ante* demand reductions claimed for specialty lamps in the program tracking data.

Table 76. 2020 Upstream Lighting *Ex Post* Demand Reduction by Product Type

Product Type	Demand Reduction (kW)			Carryover	Realization Rate
	Ex Ante	Verified	*Ex Post*		
Standard LEDs	445.06	378.24	373.35	26.05	84%
Specialty LEDs	0.00	521.17	587.47	68.31	N/A
Reflector LEDs	614.75	450.78	758.61	88.21	123%
Subtotal	**1,059.81**	**1,350.19**	**1,719.44**	**182.57**	**162%**
Program Total				**1,902.01**	**179%**

Note: Values rounded for reporting purposes.

Ex Post Net Savings

The evaluation team applied the NTG values developed in 2019 in accordance with the evaluation scope. The 2019 NTG was based on modeled bulb, prices, and promotional data using a demand elasticity model—an econometric approach to estimate the increase in demand for program LEDs attributable to

program discounts and promotions. The team modeled these data as a panel, with cross-sections of monthly program bulb sales as a function of price, retail channel, product type, and promotions.

Table 77 presents a summary of net energy savings and demand reduction by product type for the upstream lighting component.

Table 77. 2020 Upstream Lighting *Ex Post* Net Energy Savings and Demand Reduction

Product Type	*Ex Post* Gross		NTG		*Ex Post* Net	
	kWh	kW	kWh	kW	kWh	kW
Standard LEDs	2,716,790	373	62%	62%	1,684,410	231
Specialty LEDs	4,287,513	587	38%	38%	1,629,255	223
Reflector LEDs	5,535,652	759	45%	45%	2,491,043	341
Subtotal	**12,539,955**	**1,719**	**46%**	**46%**	**5,804,708**	**796**
LED Carryover						
Standard LEDs	189,544	26	62%	62%	117,517	16
Specialty LEDs	498,548	68	38%	38%	189,448	26
Reflector LEDs	643,680	88	45%	45%	289,656	40
Subtotal	**1,331,772**	**183**	**46%**	**46%**	**596,621**	**82**
Program Total	**13,871,726**	**1,902**	**46%**	**46%**	**6,401,329**	**878**

Note: Values rounded for reporting purposes.

Appliance Rebate

The following sections summarize various steps the evaluation team took to determine audited, verified, *ex post* gross, and *ex post* net savings for the appliance rebate component.

Audited Savings

To calculate audited savings for the appliance rebate component, the evaluation team reviewed the program tracking database and checked savings estimates and calculations against *ex ante* savings assumptions, and was able to confirm accurate applications of the assumptions. Following the review, the team recalculated program energy savings and demand reduction to account for errors and inconsistencies identified in the program tracking data.

The evaluation team audited measure quantities and confirmed consistency by comparing measure descriptions and numbers of units provided in the tracking database.

The analysis revealed that CLEAResult assigned the appropriate savings estimates to all program measures except pool pumps and room ACs. For the *two-speed* pool pumps, CLEAResult used the *ex ante* savings for *variable* speed units. For room ACs, CLEAResult used the *ex ante* savings for early retirement rather than that for the time of sale.

Table 78 and Table 79 show audited energy savings and demand reduction for the appliance rebate component measures.

Table 78. 2020 Appliance Rebate *Ex Ante* and Audited Energy Savings by Product Type

Measure	*Ex Ante* Energy Savings (kWh)	Audited Energy Savings (kWh)
Smart Thermostat (Manual Replacement)	41,064	41,064
Smart Thermostat (Programmable Replacement)	26,504	26,504
Air Purifier	45,456	45,456
Dehumidifier	36,393	36,393
Clothes Washer	54,742	54,742
Clothes Dryer	41,119	41,119
Pool Pump	44,273	17,004
Ceiling Fan	247	247
Refrigerator	780	780
Room Air Conditioner	2,041	108
Television	146	146
Total	**292,764**	**263,562**

Note: Values rounded for reporting purposes.

Table 79. 2020 Appliance Rebate *Ex Ante* and Audited Reduction by Product Type

Measure	*Ex Ante* Demand Reduction (kW)	Audited Demand Reduction (kW)
Smart Thermostat (Manual Replacement)	0.00	0.00
Smart Thermostat (Programmable Replacement)	0.00	0.00
Air Purifier	6.50	6.50
Dehumidifier	8.34	8.34
Clothes Washer	7.59	7.59
Clothes Dryer	5.52	5.52
Pool Pump	65.72	43.41
Ceiling Fan	0.05	0.05
Refrigerator	0.12	0.12
Room Air Conditioner	1.85	0.10
Television	0.00	0.00
Total	**95.68**	**71.63**

Note: Values rounded for reporting purposes.

Verified Savings

The evaluation team applied first-year installation rates, derived through a survey of 2020 IPL appliance rebate customers, to calculate verified energy savings and demand reduction. The study included a survey with 54 customers who received rebates for eligible equipment. All respondents reported that their rebated equipment is currently installed. Table 80 shows the installation rates applied to appliance rebate measures.

Table 80. 2020 Appliance Rebate Installation Rates by Product Type

Measure	Installation Rate
Smart Thermostat (Manual Replacement)	100%
Smart Thermostat (Programmable Replacement)	100%
Air Purifier	100%
Dehumidifier	100%
Clothes Washer	100%
Clothes Dryer	100%
Pool Pump	100%
Ceiling Fan	100%
Refrigerator	100%
Room Air Conditioner	100%
Television	100%

Table 81 and Table 82 show verified energy savings and demand reduction by product type, respectively. The program achieved 90% of the *ex ante* energy savings and 75% of the *ex ante* demand reduction, based on verified savings.

Table 81. 2020 Appliance Rebate Verified Energy Savings by Product Type

Measure	*Ex Ante* Energy Savings (kWh)	Verified Energy Savings (kWh)
Smart Thermostat (Manual Replacement)	41,064	41,064
Smart Thermostat (Programmable Replacement)	26,504	26,504
Air Purifier	45,456	45,456
Dehumidifier	36,393	36,393
Clothes Washer	54,742	54,742
Clothes Dryer	41,119	41,119
Pool Pump	44,273	17,004
Ceiling Fan	247	247
Refrigerator	780	780
Room Air Conditioner	2,041	108
Television	146	146
Total	**292,764**	**263,562**

Note: Values rounded for reporting purposes.

Table 82. 2020 Appliance Rebate Verified Demand Reduction by Product Type

Measure	*Ex Ante* Demand Reduction (kW)	Verified Demand Reduction (kW)
Smart Thermostat (Manual Replacement)	0.00	0.00
Smart Thermostat (Programmable Replacement)	0.00	0.00
Air Purifier	6.50	6.50
Dehumidifier	8.34	8.34
Clothes Washer	7.59	7.59
Clothes Dryer	5.52	5.52
Pool Pump	65.72	43.41
Ceiling Fan	0.05	0.05
Refrigerator	0.12	0.12
Room Air Conditioner	1.85	0.10
Television	0.00	0.00
Total	**95.68**	**71.63**

Note: Values rounded for reporting purposes.

Ex Post Gross Savings

The evaluation team determined the program *ex post* gross energy savings and demand reduction through an engineering analysis. Similar to the *ex ante* calculations, algorithms included baseline equipment assumptions, AOH, interactive effects, coincidence factors (for demand reduction), and installation rate assumptions.

We determined that per-unit savings assumptions for appliances were reasonable by confirming *ex ante* assumptions to deemed values available in the most recent version of Indiana TRM (v2.2). When measures were not described in the Indiana TRM (v2.2), we relied on the most recent version of the Illinois TRM (v8). *Appendix H* contains the detailed equations the evaluation team used to calculate 2020 energy savings and demand reduction for the program and provides summary tables of savings assumptions and their sources.

For smart thermostats, the team confirmed that units replacing a previously installed programmable thermostat were reasonable based on the Indiana TRM (v2.2). However, for units that replaced manual thermostats, we determined that *ex ante* savings underestimated kilowatt-hour savings compared to previous evaluations (which have been based on a Cadmus metering study from 2015).[30] *Ex post* savings reflect this update to account for the increase in kilowatt-hour savings. Table 83 and Table 84 show *ex post* energy savings and demand reduction for the appliance rebate component measures, respectively.

[30] Cadmus. January 29, 2015. *Evaluation of the 2013-2014 Programmable and Smart Thermostat Program.* Prepared for Northern Indiana Public Service Company and Vectren Corporation.

Table 83. 2020 Appliance Rebate *Ex Post* Energy Savings by Product Type

Measure	Energy Savings (kWh)			Realization Rate
	Ex Ante	Verified	*Ex Post*	
Smart Thermostat (Manual Replacement)	41,064	41,064	44,918	109%
Smart Thermostat (Programmable Replacement)	26,504	26,504	26,504	100%
Air Purifier	45,456	45,456	45,456	100%
Dehumidifier	36,393	36,393	36,393	100%
Clothes Washer	54,742	54,742	54,742	100%
Clothes Dryer	41,119	41,119	41,119	100%
Pool Pump	44,273	17,004	17,004	38%
Ceiling Fan	247	247	247	100%
Refrigerator	780	780	780	100%
Room Air Conditioner	2,041	108	108	5%
Television	146	146	146	100%
Program Total	**292,764**	**263,562**	**267,417**	**91%**

Note: Values rounded for reporting purposes.

Table 84. 2020 Appliance Rebate *Ex Post* Demand Reduction by Product Type

Measure	Demand Reduction (kW)			Realization Rate
	Ex Ante	Verified	*Ex Post*	
Smart Thermostat (Manual Replacement)	0.00	0.00	0.00	N/A
Smart Thermostat (Programmable Replacement)	0.00	0.00	0.00	N/A
Air Purifier	6.50	6.50	6.50	100%
Dehumidifier	8.34	8.34	8.34	100%
Clothes Washer	7.59	7.59	7.59	100%
Clothes Dryer	5.52	5.52	5.52	100%
Pool Pump	65.72	43.41	43.41	66%
Ceiling Fan	0.05	0.05	0.05	100%
Refrigerator	0.12	0.12	0.12	100%
Room Air Conditioner	1.85	0.10	0.10	5%
Television	0.00	0.00	0.00	100%
Program Total	**95.68**	**71.63**	**71.63**	**75%**

Note: Values rounded for reporting purposes.

Ex Post Net Savings

The evaluation team calculated freeridership and spillover following the methods described in *Appendix B*, using survey data collected from 2020 participants. As shown in Table 85, the team estimated a 64% NTG for the appliance rebate program component.

Table 85. 2020 Appliance Rebate Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Appliance Rebate	39%	3%	64%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Freeridership

To determine freeridership, the evaluation team asked respondents whether—in the program's absence—they would have installed equipment at the same efficiency level, at the same time, and in same amount. Based on survey feedback, the team calculated a 39% overall freeridership score for the program, as shown in Table 86.

Table 86. 2020 Appliance Rebate Program Freeridership Results

Program Component	Responses (n)	Freeridership [a]	*Ex Post* Gross Population Savings (kWh)
Appliance Rebate	51	39%	267,417

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The evaluation team assessed freeridership in two parts, *intention* and *influence*, to understand customer plans and motivations and the influence of the program on their decisions. By averaging the *intention* and *influence* freeridership scores, the evaluation team produced a program averaging savings-weighted freeridership score. Refer to *Appendix B* for further details on *intention* and *influence* questions and scoring methodologies.

Intention Freeridership

The evaluation team estimated *intention* freeridership scores for all participants based on their responses to the *intention*-focused freeridership questions. Intention, in this case, refers to whether program participants would have purchased a program-qualifying unit in absence of the program. As shown in Table 87, the appliance rebate program component *intention* freeridership score was 58%.

Table 87. 2020 Appliance Rebate *Intention* Freeridership Results

Program Component	Responses (n)	*Intention* Freeridership [a]
Appliance Rebate	51	58%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

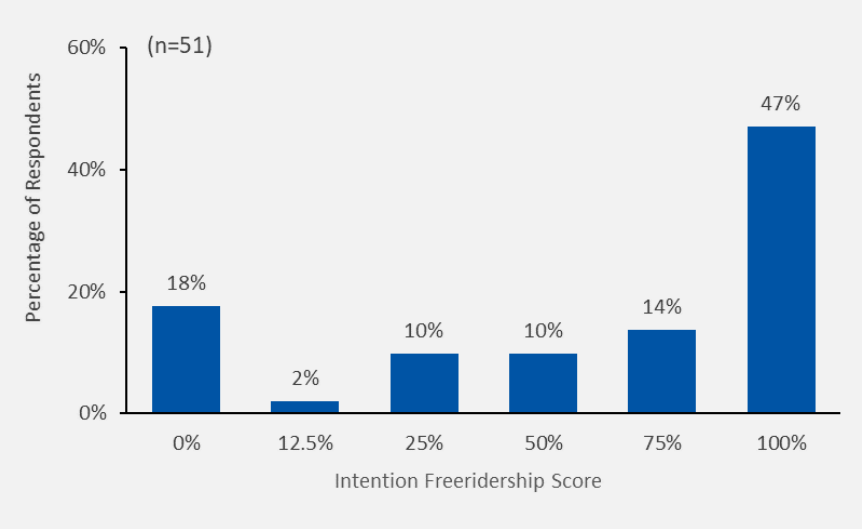
Table 88 shows the unique appliance rebate component's participant response combinations, resulting from *intention* freeridership questions, along with *intention* freeridership scores assigned to each combination and the number of responses for each combination. An "x" indicates a skipped question (depending on the participant's response to a previous question). "Yes," "Partial," and "No" values indicate if the respondent's answer to a given question indicated freeridership.

Table 88. 2020 Appliance Rebate Frequency of *Intention* Freeridership Scoring Combinations

1 Already planning to purchase?	2. Already ordered or installed?	3. Confirm, already ordered or installed?	4. Installed same measure without incentive?	5. Confirm, would not have installed any measure?	6. Installed same efficiency?	7. Installed same efficiency?	8. Installed same quantity or more?	9. Installed within one year?	Freeridership score	Response frequency
Yes	Yes	Yes	x	x	x	x	x	x	100%	15
Yes	No	x	Yes	x	Yes	x	x	Yes	100%	7
Yes	No	x	Yes	x	Partial	x	No	Yes	25%	1
Yes	No	x	Yes	x	Partial	x	x	Yes	75%	4
Yes	No	x	Yes	x	Partial	x	x	Partial	50%	1
Yes	No	x	Yes	x	No	x	x	x	0%	1
Yes	No	x	Yes	x	x	Yes	Yes	Yes	100%	1
Yes	No	x	Yes	x	x	Yes	x	Yes	100%	1
Yes	No	x	Partial	Partial	x	x	x	x	75%	3
Yes	No	x	No	Yes	Partial	x	x	Yes	50%	1
Yes	No	x	No	Yes	No	x	x	x	0%	3
Partial	X	x	Partial	Partial	x	x	x	x	50%	2
Partial	X	x	No	Partial	x	x	x	x	25%	1
Partial	X	x	No	No	x	x	x	x	0%	1
No	X	x	Yes	x	Yes	x	x	Yes	50%	1
No	X	x	Yes	x	Yes	x	x	No	0%	1
No	X	x	Yes	x	Partial	x	x	Yes	25%	1
No	X	x	Partial	Partial	x	x	x	x	25%	2
No	X	x	No	Yes	No	x	x	x	0%	1
No	X	x	No	Partial	x	x	x	x	12.5%	1
No	X	x	No	No	x	x	x	x	0%	2

Figure 42 shows the distribution of individual intention freeridership scores.

Figure 42. 2020 Appliance Rebate Distribution of Intention Freeridership Scores



Influence Freeridership

The evaluation team assessed *influence* freeridership by asking participants how influential various program elements were in their purchasing decision-making process. Table 89 shows program elements that participants rated for importance, along with counts and average ratings for each factor.

Table 89. 2020 Appliance Rebate *Influence* Freeridership Responses

Influence Rating	*Influence* Score	Program Information from Contractor	IPL Equipment Rebate	Energy Efficiency Information from IPL	Previous IPL Energy Efficiency Program Participant
1 - Not at all important	100%	2	2	4	6
2	75%	0	5	8	5
3	25%	1	23	19	13
4 - Very important	0%	0	13	15	7
Not applicable	50%	8	8	5	20
Average Rating		**1.7**	**3.1**	**3.0**	**2.7**

The team determined each respondent's *influence* freeridership rate for each measure category, using the maximum rating provided for any factor included in Table 89. As shown in Table 90, the respondents' maximum influence ratings ranged from 1 (*not at all important*) to 4 (*very important*). A maximum score of 1 meant the customer ranked all factors from the table as *not at all important*, while a maximum score of 4 meant the customer ranked at least one factor as *very important*. Counts refer to the number of "maximum influence" responses for each factor/influence score response option.

Table 90. 2020 Appliance Rebate *Influence* Freeridership Score

Maximum *Influence* Rating	*Influence* Score	Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)
1 - Not at all important	100%	2	472	472
2	75%	2	509	382
3	25%	18	7,153	1,788
4 - Very important	0%	24	7,830	0
Not applicable/Don't know	50%	5	1,287	644
Average Maximum *Influence* Rating (Simple Average)				**3.4**
Average *Influence* Score (Weighted by *Ex Post* Savings)				**19%**

Final Freeridership

The evaluation team calculated the mean of *intention* and *influence* freeridership components to estimate a 39% final freeridership for the appliance rebate program component:

$$Final\ Freeridership = \frac{Intention\ FR\ Score\ (58\%) + Influence\ FR\ Score\ (19\%)}{2}$$

A higher freeridership score translates to more savings being deducted from gross savings estimates. Table 91 presents the *intention*, *influence*, and final freeridership scores for the appliance rebate component.

Table 91. 2020 Appliance Rebate Freeridership Score

Program Component	Responses (n)	*Intention* Score	*Influence* Score	Freeridership Score
Appliance Rebate	51	58%	19%	39%

Spillover

As detailed in *Appendix B,* the evaluation team estimated spillover measure savings using specific information about participants, determined through the evaluation, and employing the Indiana TRM (v2.2) as a baseline reference. The team estimated the percentage of program spillover by dividing the sum of additional spillover savings (reported by survey respondents) by total gross savings achieved by all survey respondents. The appliance rebate component had a 3% spillover estimate, rounded to the nearest whole percentage, as shown in Table 92.

Table 92. 2020 Appliance Rebate Spillover

Spillover Savings (kWh)	Participant Program Savings (kWh)	Spillover
566	17,250	3%

Four participants reported that, overall, the program proved *very important* in their decision to install additional high-efficiency measures (for which they did not receive a rebate from IPL). Table 93 shows these additional spillover measures and total resulting energy savings.

Table 93. 2020 Appliance Rebate Spillover Measures, Quantity, and Savings

Spillover Measure	Quantity	Total Energy Savings (kWh)
Smart Wi-Fi thermostat	1	146.4
Central air conditioner	3	420.0
Total	**N/A**	**556.4**

Table 94 summarizes freeridership and spillover for the appliance rebate program component, resulting in a NTG of 64%, which is within the typical range for downstream appliance rebate programs. The team calculated NTG for the appliance rebate program component using the following equation:

$$Program\ NTG = 100\% - Freeridership + Participant\ Spillover$$

Table 94. 2020 Appliance Rebate Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Appliance Rebate	39%	3%	64%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Evaluated Net Savings Adjustments

Table 95 presents the savings, realization rates, and NTG for the appliance rebate component.

Table 95. 2020 Appliance Rebate *Ex Post* Gross and Net Energy Savings and Demand Reduction

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kWh	kW		kWh	kW
Smart Thermostat (Manual Replacement)	44,918	0.00	64%	28,748	0.00
Smart Thermostat (Programmable Replacement)	26,504	0.00	64%	16,963	0.00
Air Purifier	45,456	6.50	64%	29,092	4.16
Dehumidifier	36,393	8.34	64%	23,291	5.34
Clothes Washer	54,742	7.59	64%	35,035	4.86
Clothes Dryer	41,119	5.52	64%	26,316	3.53
Pool Pump	17,004	43.41	64%	10,883	27.78
Ceiling Fan	247	0.05	64%	158	0.03
Refrigerator	780	0.12	64%	499	0.08
Room Air Conditioner	108	0.10	64%	69	0.06
Television	146	0.00	64%	94	0.00
Program Total	**267,417**	**71.63**	**64%**	**171,147**	**45.84**

Note: Values rounded for reporting purposes.

IPL Marketplace

The following sections summarize various steps the evaluation team took to determine audited, verified, *ex post* gross, and *ex post* net savings for lamps and other measures sold through the IPL Marketplace.

Audited Savings

To audit IPL Marketplace energy savings and demand reduction, the evaluation team reviewed the program tracking database and checked savings estimates and calculations against the *ex ante* savings assumptions, and was able to confirm accurate application of the assumptions.[31] Following the review, the team recalculated program energy savings and demand reduction to account for errors and inconsistencies identified in the program tracking data.

To confirm consistency, the evaluation team audited measure quantities by comparing measure descriptions to the number of units provided in the tracking database, and we found no inconsistencies. As part of this audit, the team recalculated energy savings and demand reduction values using *ex ante* assumptions provided by CLEAResult. We determined that CLEAResult assigned appropriate savings estimates to all program component measures. Table 96 shows audited energy savings and demand reduction for IPL Marketplace measures.

Table 96. 2020 IPL Marketplace *Ex Ante* and Audited Savings by Product Type

Product Type	Energy Savings (kWh)		Demand Reduction (kW)	
	Ex Ante [a]	Audited	*Ex Ante* [a]	Audited
Standard LEDs	346,428	346,428	59.70	59.70
Specialty LEDs	48,257	48,257	8.32	8.32
Reflector LEDs	25,367	25,367	4.37	4.37
Smart Thermostat	1,089,231	1,089,231	0.00	0.00
Smart Power Strip	50,400	50,400	9.07	9.07
Total	**1,559,682**	**1,559,682**	**81.46**	**81.46**

Note: Values rounded for reporting purposes.

[a] The team determined *ex ante* energy savings from program tracking data, which included 20,682 lamps, as the scorecards do not provide measure-level detailed savings for the IPL Marketplace.

Verified Savings

The evaluation team used participant survey data to generate ISRs for IPL Marketplace measures. The survey revealed that 74% of smart thermostats, 80% of power strips, and 79% of LEDs were presently installed at the time participants were surveyed, though several intend to install the measure in the near future. Table 97 presents ISRs for IPL Marketplace measures.

[31] The evaluation team confirmed that CLEAResult used values that align with the most recent version of the Illinois TRM (v8) where the Indiana TRM (v2.2) did not contain information on a particular measure.

Table 97. 2020 IPL Marketplace Installation Rates by Product Type

Product Type	Installation Rate	Relative Precision (at 90% confidence)
Standard LEDs	79%	±1.0%
Specialty LEDs	79%	±1.0%
Reflector LEDs	79%	±1.0%
Smart Thermostat	74%	±8.7%
Smart Power Strip	80%	±9.0%

Table 98 shows verified energy savings and demand reduction by product type. The IPL Marketplace program component achieved 76% of *ex ante* energy savings and 79% of *ex ante* demand reduction based on verified savings.

Table 98. 2020 IPL Marketplace Verified Energy Savings and Demand Reduction by Product Type

Product Type	Energy Savings (kWh)		Demand Reduction (kW)	
	Ex Ante	Verified	*Ex Ante*	Verified
Standard LEDs	346,428	273,963	59.70	47.21
Specialty LEDs	48,257	38,162	8.32	6.58
Reflector LEDs	25,367	20,061	4.37	3.46
Smart Thermostat	1,089,231	807,533	0.00	0.00
Smart Power Strip	50,400	40,091	9.07	7.22
Total	**1,559,682**	**1,179,811**	**81.46**	**64.46**

Note: Values rounded for reporting purposes.

Ex Post Gross Savings

The evaluation team determined the program *ex post* gross energy savings and demand reduction through an engineering analysis. Similar to the *ex ante* calculations, algorithms had baseline equipment assumptions, including baseline watts (for lighting) as well as AOH, interactive effects, coincidence factors (for demand reduction), and installation rate assumptions for all measures. The evaluation team relied on a range of data sources to ensure that we used the most recent and accurate savings assumptions.

We determined that per-unit savings assumptions for smart power strips were all reasonable by comparing *ex ante* assumptions to deemed values available in the most recent version of the Illinois TRM (v8). For smart thermostats, we determined that *ex ante* savings overestimated kilowatt-hour savings by relying on full-load cooling hour inputs for Evansville, Indiana, instead of hours for Indianapolis. When calculating *ex post* savings, the evaluation team accounted for a slightly shorter cooling season.

To determine carryover savings, the evaluation team used the same approach as discussed in the upstream lighting section. The team applied an adjusted lifetime ISR of 89% (ending savings in 2023) to standard LEDs and a 95% ISR for specialty and reflector lamps, thus accounting for carryover savings as

lamps are installed in future years. *Appendix H* describes the team's methodology and assumptions to calculate carryover savings in greater detail.

Realization rates varied by product type:

- As in 2018 and 2019, the primary drivers of lower realization rates for ***thermostats*** were the lower per-unit savings applied to smart thermostats, same as that applied for downstream rebated thermostats, to account for Indianapolis-based full-load cooling hours.
- Differences in baseline wattage assumptions, based on the UMP-recommended lumens binning approach used for ***upstream lighting***, drove lighting realization rates over 100%.
- ***Smart power strip*** per-unit savings were appropriate; however, the latest participant survey results show a decrease in ISR, resulting in a realization rate less than 100%.

Table 99 and Table 100 describe *ex post* energy savings and demand reduction for the IPL Marketplace measures.

Table 99. 2020 IPL Marketplace *Ex Post* Energy Savings by Product Type

Product Type	Energy Savings (kWh)			Carryover	Realization Rate
	Ex Ante	Verified	*Ex Post*		
Standard LEDs	346,428	273,963	403,140	50,557	116%
Specialty LEDs	48,257	38,162	59,089	11,893	122%
Reflector LEDs	25,367	20,061	45,798	9,218	181%
Smart Thermostat	1,089,231	807,533	655,448	--	60%
Smart Power Strip	50,400	40,091	40,091	--	80%
Subtotal				**71,669**	**77%**
Program Total	**1,559,682**	**1,179,811**	**1,203,566**	**1,275,235**	**82%**

Note: Values rounded for reporting purposes.

Table 100. 2020 IPL Marketplace *Ex Post* Demand Reduction by Product Type

Product Type	Demand Reduction (kW)			Carryover	Realization Rate
	Ex Ante	Verified	*Ex Post*		
Standard LEDs	59.70	47.21	55.24	6.93	93%
Specialty LEDs	8.32	6.58	8.10	1.63	97%
Reflector LEDs	4.37	3.46	6.28	1.26	144%
Smart Thermostat	0.00	0.00	0.00	--	N/A
Smart Power Strip	9.07	7.22	7.22	--	80%
Subtotal				**9.82**	**94%**
Program Total	**81.46**	**64.46**	**76.82**	**86.64**	**106%**

Note: Values rounded for reporting purposes.

Ex Post Net Savings

The evaluation team calculated freeridership and spillover using methods described in *Appendix B*, employing survey data collected from 2020 participants. As shown in Table 101, the team estimated a

99% NTG for the smart thermostats, 82% NTG for smart power strips, and 81% NTG for LEDs sold through the IPL Marketplace.

Table 101. 2020 IPL Marketplace Net-to-Gross Summary

Product Type	Freeridership [a]	Spillover	NTG
Smart Thermostats	14%	13%	99%
Smart Power Strips	18%	0%	82%
LEDs	22%	3%	81%

[a] The team weighted smart thermostat freeridership by the survey sample *ex post* gross kilowatt-hour savings, while we weighted LED freeridership by the quantity of bulbs installed.

Freeridership - Smart Thermostats and Smart Power Strips

To determine freeridership, the evaluation team asked respondents whether, in absence of the program, they would have installed equipment at the same efficiency level, at the same time, and in the same amount. Based on survey feedback, the team calculated a 14% overall freeridership score for the IPL Marketplace smart thermostat program component and a 18% overall freeridership score for the smart power strip program component, as shown in Table 102.

Table 102. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip Freeridership Scores

Product Type	Responses (n)	Freeridership [a]	*Ex Post* Gross Population Savings (kWh)
Smart Thermostats	50	14%	655,448
Smart Power Strips	25	18%	40,091

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

By averaging the savings-weighted *intention* methodology with the savings-weighted *influence* methodology, the evaluation team produced an IPL Marketplace smart thermostat freeridership score. Refer to *Appendix B* for further details on *intention* and *influence* questions and scoring methodologies.

Intention Freeridership

The evaluation team estimated *intention* freeridership scores for all participants based on their responses to the *intention*-focused freeridership questions. As shown in Table 103, the IPL Marketplace smart thermostats had an *intention* freeridership score of 22% and the smart power strips had *intention* freeridership score of 33%.

Table 103. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip *Intention* Freeridership Results

Product Type	Responses (n)	*Intention* Freeridership [a]
Smart Thermostats	50	22%
Smart Power Strips	25	33%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Table 104 shows the unique IPL Marketplace participant response combinations resulting from *intention* freeridership questions, the *intention* freeridership score assigned to each combination, and the number

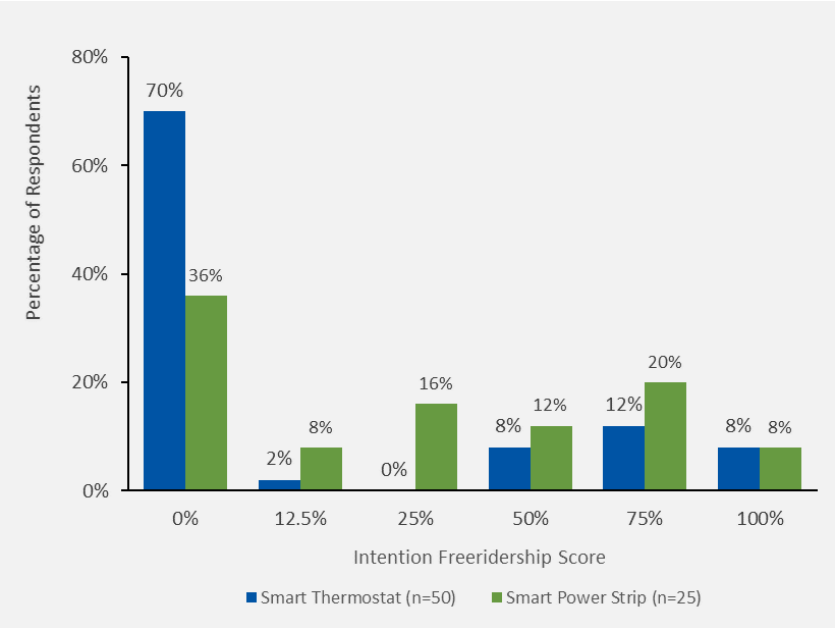
of responses for each combination. An "x" indicates a skipped question (depending on the participant's response to a previous question), while "Yes," "Partial," and "No" values represent whether the respondent's answer to a given question indicated freeridership.

Table 104. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip Frequency of *Intention* Freeridership Scoring Combinations

1 Already planning to purchase?	2. Installed same measure without incentive?	3. Confirm, would not have installed any measure?	4. Installed same efficiency? (smart power strips only)	5. Installed same efficiency? (smart thermostats only)	6. Installed same quantity or more?	7. Installed within one year?	Freeridership score	Response frequency – smart thermostats	Response frequency – smart power strips
Yes	Yes	x	x	Yes	Yes	Yes	100%	1	0
Yes	Yes	x	x	Yes	Yes	Partial	75%	1	0
Yes	Yes	x	x	Yes	Yes	No	0%	1	0
Yes	Yes	x	x	Yes	x	Yes	100%	3	0
Yes	Yes	x	x	Yes	x	Partial	75%	4	0
Yes	Yes	x	x	Yes	x	No	0%	4	0
Yes	Yes	x	x	No	x	x	0%	2	0
Yes	No	Yes	x	Yes	x	Yes	75%	1	0
Yes	No	Yes	x	Yes	x	Partial	50%	3	0
Yes	No	Yes	x	No	x	x	0%	3	0
Yes	No	No	x	x	x	x	0%	8	3
No	Yes	x	x	Yes	Yes	No	0%	1	0
No	Yes	x	x	Yes	x	Yes	50.0%	1	0
No	Yes	x	x	Yes	x	No	0%	1	0
No	Yes	x	x	No	x	x	0%	1	0
No	No	Yes	x	Yes	x	Partial	12.5%	1	0
No	No	Yes	x	Yes	x	No	0%	2	0
No	No	Yes	x	No	x	x	0%	3	0
No	No	No	x	x	x	x	0%	9	5
Yes	Yes	x	Yes	x	Yes	Partial	75%	0	1
Yes	Yes	x	Yes	x	No	No	0%	0	1
Yes	Yes	x	No	x	x	x	100%	0	2
Yes	No	Yes	Yes	x	Yes	Yes	75%	0	1
Yes	No	Yes	Yes	x	x	Yes	75%	0	1
Yes	No	Yes	Yes	x	x	Partial	50%	0	1
Yes	No	Yes	No	x	x	x	75%	0	2
Yes	No	No	x	x	x	x	0%	8	3
No	Yes	x	Yes	x	x	Yes	50%	0	1
No	Yes	x	No	x	x	x	50%	0	1
No	No	Yes	Yes	x	Yes	Partial	12.5%	0	1
No	No	Yes	Yes	x	x	Yes	25%	0	2
No	No	Yes	Yes	x	x	Partial	12.5%	0	1
No	No	Yes	No	x	x	x	25%	0	2
No	No	No	x	x	x	x	0%	9	5

Figure 43 shows the distribution of individual intention freeridership scores.

Figure 43. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip Distribution of Intention Freeridership Scores



Influence Freeridership

The evaluation team assessed *influence* freeridership by asking participants how important various program elements were in their purchasing decision-making process. Table 105 shows program elements that participants rated for importance, along with a count and average rating for each factor.

Table 105. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip *Influence* Freeridership Responses

Influence Rating	*Influence* Score	Program Information from Contractor		IPL Instant Rebate		Energy Efficiency Information from IPL		Previous IPL Energy Efficiency Program Participation	
		Smart Thermostat	Smart Power Strip	Smart Thermostat	Smart Power Strip	Smart Thermostat	Smart Power Strip	Smart Thermostat	Smart Power Strip
1 - Not at all important	100%	3	1	0	0	1	0	1	0
2—Not too important	75%	5	2	1	2	8	2	1	2
3—Somewhat important	25%	5	4	10	8	13	6	15	5
4 - Very important	0%	7	7	38	15	25	17	14	12
Not applicable	50%	30	11	1	0	3	0	19	6
Average Rating		**2.8**	**3.2**	**3.8**	**3.5**	**3.3**	**3.6**	**3.4**	**3.5**

The team determined each respondent's *influence* freeridership rate for each measure category using the maximum rating provided for any factor included in Table 105. As shown in Table 106, the respondents' maximum influence ratings ranged from 1 (*not at all important*) to 4 (*very important*). A maximum score of 1 meant the customer ranked all factors from the table as *not at all important*, while a maximum score of 4 meant the customer ranked at least one factor as *very important*. Counts refer to the number of "maximum influence" responses for each factor/influence score response option.

Table 106. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip *Influence* Freeridership Scores

Maximum *Influence* Rating	*Influence* Score	Smart Thermostat			Smart Power Strip		
		Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)	Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)
1 - Not at all important	100%	0	0	0	0	0	0
2	75%	0	0	0	1	119	89
3	25%	8	2,323	581	2	358	89
4 - Very important	0%	41	11,875	0	22	5,011	0
Not applicable	50%	1	258	129	0	0	0
Average Maximum Influence Rating (Simple Average)		**3.8**			**3.8**		
Average Influence Score (Weighted by *Ex Post* Savings)		**5%**			**3%**		

Final Freeridership

The evaluation team calculated the mean of the *intention* and *influence* freeridership components to estimate a final freeridership for the IPL Marketplace smart thermostat and smart power strip program measures:

$$Final\ Freeridership = \frac{Intention\ FR\ Score\ (\%) + Influence\ FR\ Score\ (\%)}{2}$$

A higher freeridership score translates to more savings being deducted from the gross savings estimates. Table 107 presents the *intention*, *influence*, and final freeridership scores for the IPL Marketplace smart thermostats and smart power strips.

Table 107. 2020 IPL Marketplace Smart Thermostat and Smart Power Strip Freeridership Scores

Product Type	Responses (n)	*Intention* Score	*Influence* Score	Freeridership Score
Smart Thermostats	50	22%	5%	14%
Smart Power Strips	25	33%	3%	18%

Spillover - Smart Thermostats

As detailed in *Appendix B*, the evaluation team estimated spillover measure savings using specific information about participants, determined through the evaluation, and employing the Indiana TRM (v2.2) as a baseline reference. The team estimated the percentage of program spillover by dividing the sum of additional spillover savings (reported by survey respondents) by the total gross savings achieved by all survey respondents. The IPL Marketplace smart thermostat measures had a 13% spillover estimate, rounded to the nearest whole percentage, as shown in Table 108. No smart power strip respondents attributed additional energy-efficient measure purchases to IPL program influence.

Table 108. 2020 IPL Marketplace Smart Thermostats Spillover

Spillover Savings (kWh)	Participant Program Savings (kWh)	Spillover
1,886	14,457	13%

Four smart thermostat participants reported that, overall, the program proved *very important* in their decision to install additional high-efficiency measures (for which they did not receive a rebate from IPL). Table 109 shows these additional spillover measures and total resulting energy savings.

Table 109. 2020 IPL Marketplace Smart Thermostats Spillover Measures, Quantity, and Savings

Spillover Measure	Quantity	Total Energy Savings (kWh)
ENERGY STAR Air Purifier	1	568
ENERGY STAR Clothes Dryer	2	321
ENERGY STAR Clothes Washer	2	404
ENERGY STAR Dehumidifier	1	270
ENERGY STAR Refrigerator	1	130
Attic Insulation	1,000 square feet	193
Total	**N/A**	**1,886**

Table 110 summarizes freeridership and spillover for the IPL Marketplace smart thermostat and smart power strip measures. The team calculated NTG for the IPL Marketplace using the following equation:

$$NTG = 100\% - Freeridership + Participant\ Spillover$$

Table 110. 2020 IPL Marketplace Smart Thermostats Net-to-Gross Summary

Product Type	Freeridership [a]	Spillover	NTG
Smart Thermostats	14%	13%	99%
Smart Power Strips	18%	0%	82%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Freeridership - LEDs

To determine IPL Marketplace LED freeridership, the evaluation team asked participants about whether, in absence of the IPL Marketplace, they would have purchased LEDs within one year. Based on survey feedback, the team calculated overall freeridership for the IPL Marketplace LED measures as 22%.

The evaluation team estimated freeridership for each participant based on their responses to the following questions:

- FR1. "If you had not received the IPL Marketplace instant rebate for the LEDs, would you have purchased LEDs on your own?"
- FR2. "When would you have purchased the LEDs?"

The team considered a participant who answered "No" to FR1 as a 0% freerider, and considered a participant who answered "already had them installed in all available sockets" to FR1 as a 100% freerider. If participants answered "Yes" to FR1, the evaluation team based their freeridership estimate on their answer to FR2. Table 111 shows response options to the freeridership questions, freeridership scores (FR Score) associated with each response, and the response frequency for each measure type.

Table 111. 2020 IPL Marketplace LED Freeridership Responses and Scoring

Freeridership Questions / Response Options	FR Score	Responses (n)	Total Program Bulbs Installed	Freerider Bulbs
FR1. If you had not received the IPL Marketplace instant rebate for the LEDs, would you have purchased LEDs on your own?				
No	0%	49	627	0
Already had them installed in all available sockets	100%	2	16	16
Yes. FR2. When would you have purchased the LEDs?				
Around the same time I purchased them through the IPL Marketplace	100%	13	116	116
Later, but within one year	50%	15	192	96
More than one year later	0%	3	70	0
Total	**N/A**	**82**	**1,021**	**228**
Average Freeridership Weighted by Quantity	**22%**			

Spillover - LEDs

As detailed in *Appendix B*, the evaluation team estimated spillover measure savings using specific information about participants, determined through the evaluation, and employing the Indiana TRM (v2.2) as a baseline reference. The team estimated the percentage of program spillover by dividing the sum of additional spillover savings (reported by survey respondents) by the total gross savings achieved by all survey respondents. The IPL Marketplace LED measures had a 3% spillover estimate, rounded to the nearest whole percentage, as shown in Table 112.

Table 112. 2020 IPL Marketplace LED Spillover

Spillover Savings (kWh)	Participant Program Savings (kWh)	Spillover
699	25,080	3%

Three participants reported that, overall, the program proved *very important* in their decisions to install additional high-efficiency measures (for which they did not receive a rebate from IPL). Table 113 shows these additional spillover measures and total resulting energy savings. (Note that one participant installed multiple spillover measures.)

Table 113. 2020 IPL Marketplace LED Spillover Measures, Quantity, and Savings

Spillover Measure	Quantity	Total Energy Savings (kWh)
ENERGY STAR Clothes Washer	1	161
ENERGY STAR Dishwasher	1	150
ENERGY STAR Refrigerator	1	130
Smart Thermostat	1	258
Total	**N/A**	**699**

Table 114 summarizes the freeridership and spillover for the IPL Marketplace LED measures, resulting in NTG of 81%. The team used an equation to calculate NTG for the IPL Marketplace LEDs:

$$NTG = 100\% - Freeridership + Participant\ Spillover$$

Table 114. 2020 IPL Marketplace LED Net-to-Gross Summary

Product Type	Freeridership [a]	Spillover	NTG
LEDs	22%	3%	81%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Evaluated Net Savings Adjustments

Table 115 summarizes the percentages of freeridership, spillover, and NTG for the IPL Marketplace.

Table 115. 2020 IPL Marketplace Net-to-Gross Summary

Product Type	Freeridership [a]	Spillover	NTG
Smart Thermostats	14%	13%	99%
Smart Power Strips	18%	0%	82%
LEDs	22%	3%	81%

[a] The team weighted smart thermostat freeridership by the survey sample *ex post* gross kilowatt-hour savings, while we weighted LED freeridership by the quantity of bulbs installed.

Table 116 presents the savings, realization rates, and NTG for the IPL Marketplace. This program component achieved 1,151,322 kWh of net energy savings and 70.25 kW of net demand reduction.

Table 116. 2020 IPL Marketplace *Ex Post* Net Energy Savings and Demand Reduction

Product Type	*Ex Post* Gross		NTG		*Ex Post* Net	
	kWh	kW	kWh	kW	kWh	kW
Standard LEDs	403,140	55.24	81%	81%	326,544	44.74
Specialty LEDs	59,089	8.10	81%	81%	47,862	6.56
Reflector LEDs	45,798	6.28	81%	81%	37,097	5.08
Smart Thermostat	655,448	0.00	99%	99%	648,893	0.00
Smart Power Strip	40,091	7.22	82%	82%	32,875	5.92
Subtotal	**1,203,566**	**76.82**	**91%**	**81%**	**1,093,270**	**62.30**
LED Carryover						
Standard LEDs	50,557	6.93	81%	81%	40,951	5.61
Specialty LEDs	11,893	1.63	81%	81%	9,634	1.32
Reflector LEDs	9,218	1.26	81%	81%	7,467	1.02
Subtotal	**71,669**	**9.82**	**81%**	**81%**	**58,052**	**7.95**
Program Total	**1,275,235**	**86.64**	**90%**	**81%**	**1,151,322**	**70.25**

Notes: Values rounded for reporting purposes. NTG is lower for demand due to there being no demand reduction for smart thermostats.

Process Evaluation

The evaluation team documented the program's successes and challenges during 2020, as well as changes to the program. In addition to interviewing program staff, the team conducted a participant survey with IPL Marketplace customers.

Appliance Rebate and Upstream Lighting

For the process evaluation, the evaluation team interviewed IPL and reviewed program tracking data. The participant survey with appliance rebate customers was focused on the impact evaluation.

Program Design

The eligible program appliance measures are primarily targeted to single-family homes for purchase through a retail or online store or directly on the IPL Marketplace. Customers who purchase qualified lighting through a participating retailer receive an in-store, point-of-sale rebate. If customers purchase products anywhere other than the IPL Marketplace or a participating retailer, they can submit an online rebate application through the eScore portal. By design, CLEAResult issues customer rebate checks for program appliances within 10 days of receiving an accurate and complete rebate application.

There were several program changes that occurred during 2020, including both planned changes and changes due to the COVID-19 pandemic. Key program changes included the following:

Lighting Specialty Focus. Program staff reported that a shift to specialty lighting represented a major change for the Lighting and Appliances program. Early in 2020, program staff laid the groundwork to move from being heavily focused on standard LEDs to a focus on specialty lighting such as reflector bulbs. Program staff reported that this change was implemented due to the uncertainty around the lighting landscape, and to test how the market would respond to specialty lighting. The program team

worked with retail partners to ensure appropriate signage was placed in the general lighting section of retail stores to increase customer awareness and train retailers on the change in incentives. The shift proved successful with approximately 80% of *ex ante* program savings coming from specialty lighting, as compared to 25% in 2019. The program expects to continue the specialty lighting focus through 2021.

Launch of New Measures. IPL added new measures to the appliance rebate offerings in 2020, including washers, dryers, pool pumps, televisions, and ACs. Previously, the program focused on air purifiers, dehumidifiers, and smart thermostats, which continued to be offered in 2020.

IPL sent information about the new rebates to their customers via Plugged In, a customer-facing newsletter. In addition, program staff report that CLEAResult created a bill insert for contractors to market pool pumps and worked directly with manufacturers to increase awareness about this new rebate offering. Most of the marketing work for these new measures occurred during Q1 of 2020. Many of the new measures did not reach their planning targets, though staff anticipated this, viewing 2020 as an introductory year to begin raising awareness about these new offerings amongst their customers and distribution partners.

Retail Store Marketing Changes in Response to Covid-19. Program staff ceased all in-store operations, including retailer trainings and customer events, once the Covid-19 pandemic resulted in shutdowns across the country. Program signage remained in stores, and new signage had been rolled out into retail stores in Q1 of 2020.

2020 Program Highlights

IPL and CLEAResult reported highlights from the 2020 program year, including that the program met coals, despite relatively low new appliance participation and inability to conduct in-store work due to COVID-19. The program achieved its goals, despite an unprecedented year resulting from COVID-19. While CLEAResult ceased doing in-store work due to the pandemic, program staff report that customers were still visiting participating retail locations and purchasing qualifying measures. Further, staff report that sales volume slowed initially at the start of the pandemic, but then picked back up. The program did not have to adjust incentives or rebate levels in response to COVID-19.

Implementation Barriers

IPL and CLEAResult also noted 2020 program challenges, some of which they are already addressing as part of the 2021 program implementation. The limited participation with new appliance offerings was low. Program staff reported that this was largely due to the inability to conduct in-store events. However, program staff reported that CLEAResult will be going back into retail stores during 2021 and expect rebates for these appliances to increase.

Planning for 2021

Program staff report multiple program updates and changes for 2021, including:

Focus on Specialty Lighting and New Appliance Rebates. For 2021, the program intends to focus heavily on specialty lighting, eliminating all incentives for standard lighting options. Program staff also reported that CLEAResult is planning to commence in-store work, including retailer trainings and customer

events. In addition, marketing materials have been rebranded and new signage will be placed in retail stores. The program will also market via Google Ads, Facebook Ads, customer bill inserts, and other channels.

Potential Reduction in Specialty Bulb Incentives. Program staff reported that they are considering reducing incentives for specialty bulbs, primarily due to high volume and participation. However, no final decisions have been made on incentive levels at this time.

Roll-up into Efficient Products Program. Instead of being a stand-alone program, the Lighting and Appliances program is moving forward as the Efficient Products program. Program staff reported that the key rationale for this shift was related to savings, budgeting, and ensuring the program is cost-effective.

IPL Marketplace

For the IPL Marketplace process evaluation, the evaluation team interviewed IPL and Uplight program staff to ask about changes to the IPL Marketplace design and delivery, marketing and outreach, successes and challenges during 2020, and future plans.

IPL exceeded its general goal in 2020 to increase IPL Marketplace participation over 2019. As shown in Table 117, with the exception of heat pump water heaters, IPL sold more of each type of measure in 2020 compared to 2019, increasing the number of thermostats by 76%, the number of LED bulbs by 129%, and the number of smart strips by 367%. IPL and Uplight worked closely to increase program awareness and to generate customer interest via several promotional (flash) sales throughout 2020, when IPL provided additional product discounts (focused most heavily on thermostats).

Table 117. 2020 IPL Marketplace Sales Goals by Year

Product Type	2018 Units Sold	2019 Units Sold	2020 Units Sold
LED bulbs	9,768	9,044	20,682
Thermostats	777	1,445	2,539
Smart strips	32	72	336
Heat pump water heater	-	4	1
Air purifier	-	-	14
Dehumidifier	-	-	1

Note: IPL added heat pump water heaters in 2019 and air purifiers and dehumidifiers in 2020.

Program Design

Uplight implemented the IPL Marketplace, overseeing sales, marketing, price negotiations with product vendors, incentive processing, shipments, and invoicing. Uplight regularly presents IPL with a list of energy-efficient products and IPL staff determine which items to rebate based on cost-effectiveness. IPL can add new rebated and non-rebated products at any time, as long as Uplight determines that there is sufficient demand for the product and that the forecasted product sales will cover Uplight's cost. To make the IPL Marketplace more competitive with other markets such as Lowes and Home Depot, Uplight reduced the base price of its lighting products in 2019 by focusing on a partnership with vendor

Simply Conserve and by removing high-priced products. This strategic partnership gave Uplight more flexibility and security with inventory and product offerings.

The IPL Marketplace sells multiple types of rebated and non-rebated products, shown on the product category pages, along with the original price and the price after applying the IPL rebate. Before purchasing products, IPL Marketplace customers must enter their home address for verification as a valid customer. The IPL Marketplace displays both the base product price (including any manufacturer discounts) and the rebated price. IPL continued to offer several flash sales throughout the year for both lighting and smart thermostats, timed to coincide with major holidays and shopping periods, such as back-to-school, Cyber Monday, and Earth Day. IPL offers customers free shipping on orders of at least $50.

Customers can chat with an energy advisor through the IPL Marketplace's Live Support feature or can contact a program representative via the email address and phone number listed on the IPL Marketplace. They can also access buyer's guides to read about water heaters and EVs. These guides describe the products and their uses and help customers select product models appropriate for their home. The *Water Heater Buyer's Guide* includes a questionnaire to help the reader narrow down the options and approximate the cost, benefits, and drawbacks of each option, and it includes a link so they can receive an estimate through the water heater rebate program. Uplight changed the program delivery approach in 2019 so that customers must speak to a licensed contractor at the phone number provided on the IPL Marketplace website before making a water heater purchase, as opposed to making an online purchase without speaking to a contractor. Consequently, water heaters are listed separately from the other IPL Marketplace product categories (under "Enroll in Home Services" and as a "Featured Program"). The EV Advisor included a questionnaire to suggest EV models based on buyer priorities, spending budget, amount of daily driving, and parking location. The EV Advisor also offered EV educational content related to cost-efficiency, driving range, charging time, and environmental impact.

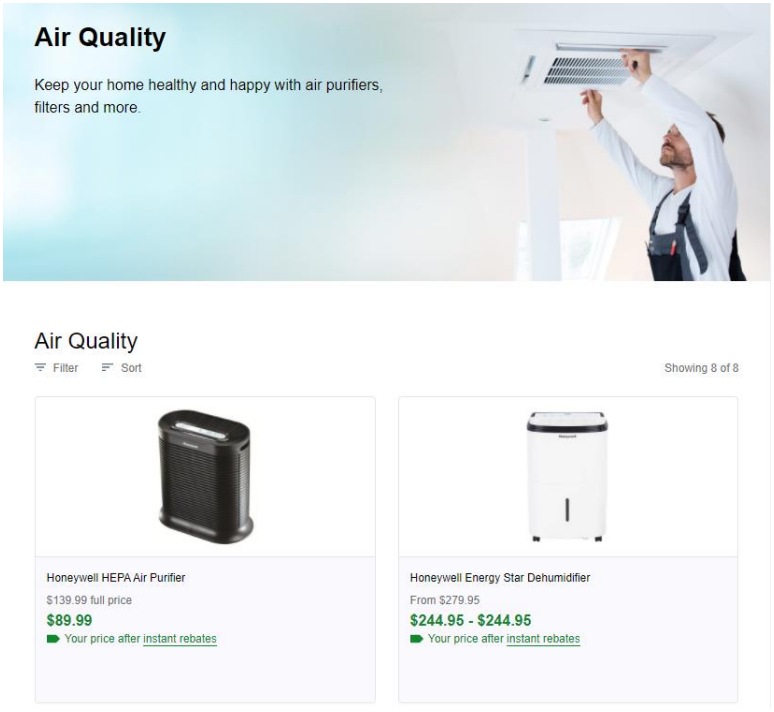
Program Changes in 2020

The biggest change to the IPL Marketplace occurred in May, when Uplight redesigned the platform to Marketplace 2.0, with the goals of improving the customer experience, increasing time spent on the site, and maximizing cart add-ons. In the new platform, Uplight improved the navigation, improved searching and filtering, and integrated the buyer's guides into the respective product pages for smart thermostat, lighting, power strip, and connected home products. Uplight also updated this platform to enable IPL to offer recommendations and product bundles, allowing for upselling and cross-promotion of items that pair well with the original item selected by a customer. Uplight also included direct access to the water heater and *Water Heater Buyer's Guide* and *EV Buyer's Guide*. The end-of-year evaluation of the changes had not occurred by the time of the interview; however, IPL noted initial indications of a higher click rate and more time spent on the IPL Marketplace following the platform changes.

IPL added one model of air purifier and one model of dehumidifier to the IPL Marketplace in July 2020. Customers purchased 14 air purifiers and one dehumidifier in 2020. As shown in Figure 44, customers can receive a rebate of $50 for an air purifier and $35 for a dehumidifier, limited to one each (as listed on the IPL "Rebated Products" page). IPL did not change incentive levels for smart thermostat, lighting,

and smart strips from 2019 to 2020. IPL updated the IPL Marketplace product selection based on manufacturer availability and new product releases.

Figure 44. 2020 IPL Marketplace Electric Hot Water Heater Rebate



In 2019, IPL integrated the IPL Marketplace with its Demand Response program by providing an additional immediate $50 discount to IPL Marketplace customers who pre-enrolled in the Demand Response program at the time of their Ecobee or Nest thermostat purchase. Customers who purchased an Ecobee could automatically enroll in the Demand Response program once they signed the terms and conditions (their device is "pre-authorized" to participate). In 2020, IPL included Nest thermostats in this process, avoiding the issue experienced in 2019 of incentivizing Nest thermostat purchasers, who pre-enrolled in the Demand Response program but never took the extra step to enroll their device with the thermostat manufacturer. Within the thermostat category, Nest thermostat sales increased by 43% between 2019 and 2020, while Ecobee thermostat sales doubled (101% increase), so this added functionality did not necessarily drive increased Nest sales in 2020.

Marketing and Outreach

Uplight marketed the program primarily to customers via targeted email. IPL considered email as the most effective marketing strategy due to the convenience of recipients being able to click right through to the IPL Marketplace. Other marketing techniques included postcards, digital ads, homepage banners on the IPL website, referral links to the IPL Marketplace from IPL's website (including its Ways to Save webpage), and cross-promotion from other programs.

Promotions

The IPL Marketplace program implementation experienced minimal impacts from the COVID-19 pandemic due to its online format, though CLEAResult changed the program marketing to accommodate the pandemic. Out of consideration for customers, CLEAResult paused program communications in the last week of March and throughout all of April to prioritize IPL safety messaging, then resumed marketing as planned in May with messages about sales and product education and integrating messages targeted toward staying at home (such as, "Save while you're staying at home.")

IPL cross-promoted the IPL Marketplace primarily through Peer Comparison reports, eScore Home Energy Assessments, and the Demand Response program. The Peer Comparison reports included a link in the report emails, encouraging recipients to save energy by going to the online IPL Marketplace. eScore kits included coupon codes to the IPL Marketplace equal to $5 for a $100 purchase and $20 for a $200 purchase. However, IPL reported a low conversion rate of coupons to IPL Marketplace purchases, and speculated that this resulted because recipients would have to go online to use the coupon code they received in their kit. The Demand Response program webpage included a link to the IPL Marketplace, but positioned the link to "Shop eligible thermostats" two sections from where it described how to "Buy a thermostat."

Future Program Changes

When asked about future challenges expected with the IPL Marketplace, IPL identified attracting customers and Uplight identified competing with other sales messaging as the main challenge, particularly because many of the marketing campaigns rely on lighting to attract customers. Uplight plans to manage this challenge through continued marketing efforts and by monitoring sales trends to keep pricing and product offerings current. Further, IPL intends to increase purchase amounts and reach tech-savvy purchasers by offering product bundles in 2021. Uplight will continue to assess how to best meet customer needs for water heaters. To improve the effectiveness of the IPL Marketplace promotion, IPL is considering increasing the coupon amount of the coupon offered. Over the long term, IPL may add non-rebated EV chargers to the IPL Marketplace in 2020.

Participant Feedback

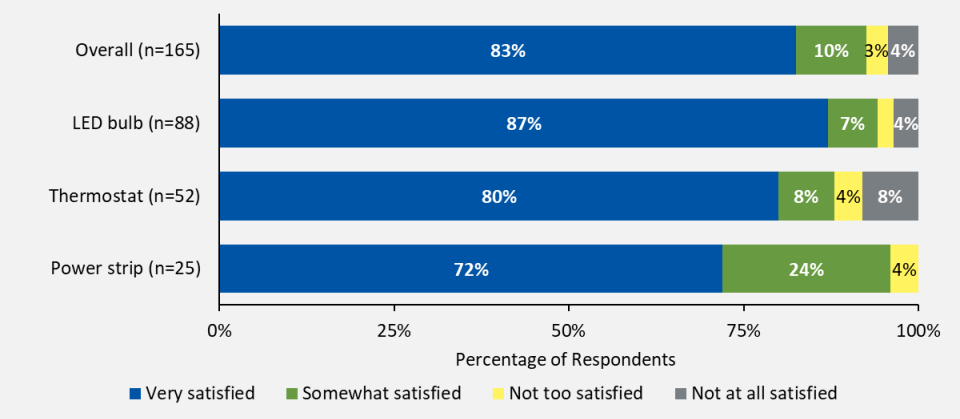
The evaluation team conducted an online survey with a sample of IPL customers who purchased products from the IPL Marketplace in 2020. In addition to collecting details to inform the accuracy of measure quantities and calculation of NTG, the team designed the survey to determine customer satisfaction with the IPL Marketplace and solicit their suggestions to improve the IPL Marketplace.

The team sought to complete 140 surveys—70 with customers who had purchased LEDs (LED respondents) and 70 with customers who had purchased a thermostat (thermostat respondents) through the IPL Marketplace. As thermostats represent a larger, less frequent purchase, the team prioritized thermostats in the sample (for customers who installed both a thermostat and LEDs). The evaluation team emailed the survey to 2,034 customers and achieved 162 total survey responses (86 from LED respondents, 51 from thermostat respondents, and 25 from power strip respondents), for an 8% response rate.

Customer Satisfaction

Overall, customers had a high level of satisfaction with the IPL Marketplace. LED (87%), thermostat (80%), and power strip (72%) respondents were overall *very satisfied* with purchasing a product from the IPL Marketplace, as shown in Figure 45. Only seven respondents reported being *not at all satisfied* with their experience with the IPL Marketplace, including both LED and thermostat purchasers. This group of respondents expressed frustration with the program due to the refund process (four respondents), dissatisfaction with the product (two respondents), delays with verifying their eligibility at a new address (one respondent), and issues finding good customer support contact info (one respondent; note that one respondent provided two mentions).

Figure 45. 2020 IPL Marketplace Participant Program Satisfaction

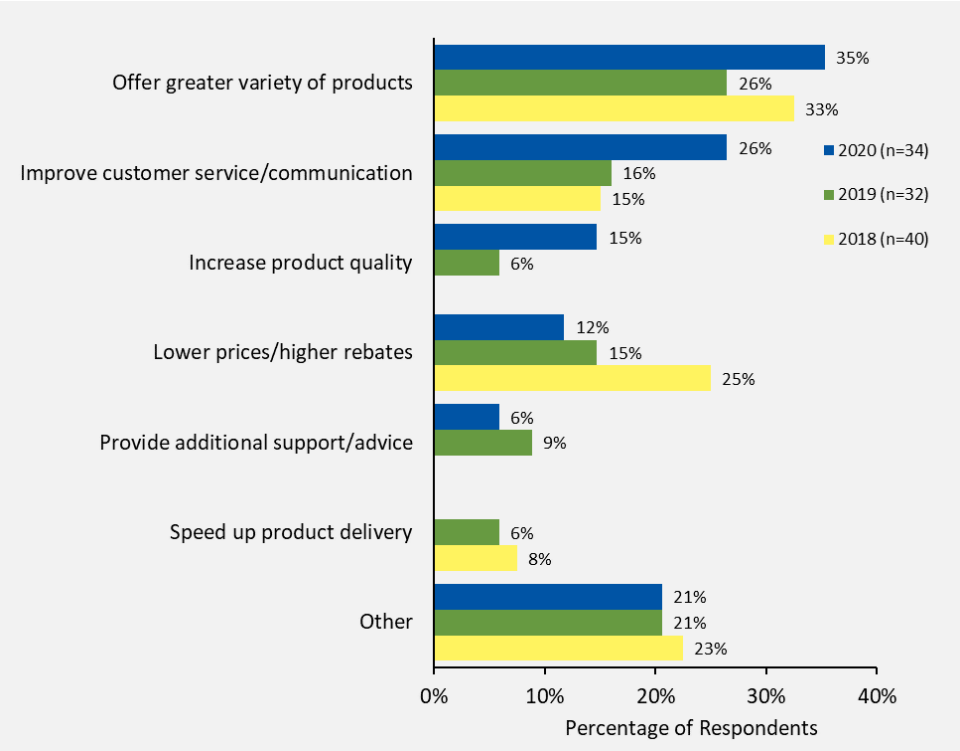


Source: 2020 IPL Marketplace Survey Question E1. "How would you rate your overall satisfaction with purchasing a product from the IPL Marketplace?"

Although most respondents expressed high satisfaction with the IPL Marketplace, 34 participants offered suggestions for IPL Marketplace improvements in 2020. As shown in Figure 46, and similar to prior years, participants most commonly wanted the IPL Marketplace to offer a greater variety of products (35%), followed by improving customer service and communication (26%), increased product quality (15%), and lower prices (12%). LED respondents were more likely than thermostat respondents to suggest a greater variety of products (seven of 17 LED respondents compared to two of 11 thermostat respondents), whereas four thermostat respondents suggest increased product quality compared to no LED respondents.

Based on the modest number of responses received in 2020, the evaluation team observed potential trends emerging over the last few program years, though none are statistically significant. Slightly more respondents recommended improving customer service or communication in 2020 (26%) than in 2019 (16%) or 2018 (15%). Similarly, more respondents suggested increasing product quality in 2020 (15%; five respondents) than in 2019 (6%) or 2018 (0%). By contrast, fewer respondents suggested lowing prices in 2020 (12%) than in 2019 (15%) or 2018 (25%).

Figure 46. 2020 IPL Marketplace Participants' Recommendations for Improving IPL Marketplace, by Program Year



Source: 2020 IPL Marketplace Survey Question G4. "What, if anything, could IPL do to improve the Marketplace?" Multiple responses allowed.

Of those who suggested improved customer service or communication, five respondents cited issues with the complexity of the return process or with delays:

- "I tried to return them but the shipping was too expensive. The representative could not get the return label emailed to me."
- "Five minutes after placing my order I realized I had ordered something I did not want but contacted seller and was told the order could not be changed."
- "Allow simpler return of product if it cannot be installed."
- "Took 6 weeks and 4 phone calls to get refunded for item."
- "Thermostat was defective and did not work. I contacted IPL about the issue and requested a refund. I did receive an eventual reply to my request that indicated that the IPL team was working on my request. That was months ago, and I have heard nothing since, so I moved on."

Two respondents sought additional support to install their thermostat. Responses categorized into the "Other" category in Figure 46 above included bundling products into starter packages (one respondent) and website issues (two respondents).

Follow-Up on 2019 Evaluation Recommendations

The evaluation team followed up with IPL program staff on recommendations made during the 2019 evaluation; Table 118 shows the status for each recommendation.

Table 118. Lighting and Appliance Program 2019 Recommendation Status

2019 Recommendation	Status
Create a buyer's guide for electric heat pump hot water heaters that explains the technology and its compatibility for existing homes.	***Completed.*** IPL created a *Water Heaters Buyer's Guide*.
Add the electric heat pump hot water heater rebate to the IPL Marketplace "Rebated Products" webpage and create a link on IPL's "Heating and Cooling Rebates" webpage to direct customers to the IPL Marketplace offerings.	***Partially Completed***. IPL now lists heat pump water heaters on their "Home Improvement Rebates" webpage and removed the "Rebated Products" webpage header as part of the 2020 platform redesign.
Invest in bill inserts to market the electric heat pump hot water heater offering on the IPL Marketplace.	***Not Completed.*** IPL did not pursue this recommendation due to communications priorities during COVID-19.
Conduct a benchmarking study of how other utilities market their heat pump hot water heater offerings compared to how Uplight markets this measure through the IPL Marketplace.	***Not Completed.*** IPL has not undertaken this study.
Assess whether adding a chargeback feature to the Demand Response program enrollment rebate makes sense. If not, consider ceasing the $50 rebate for Nest customers who enroll in the Demand Response program until their Nest device is pre-authorized.	***Completed.*** IPL added pre-authorization for Nest thermostats.
Examine whether the smart thermostat rebate can be increased cost-effectively to generate sustained customer interest (rather than spikes of customer interest during manufacturer sales).	***Not Completed/Rejected.*** IPL did not pursue this recommendation due to observing yearly growth in sales.
Examine the impact of lower LED prices on sales in 2020 (as the first full program year of lower LED prices).	***Partially Completed***. IPL is currently examining LED prices.
Use Google Analytics to identify which customers viewed LEDs, then one week later send those customers an automated distribution of a marketing email with links to the *LED Buyer's Guide*. Customers may need repeated exposure to the IPL Marketplace and product information before making a purchase.	***Not Completed.*** This recommendation is not technologically feasible at this time.
Consider running a promotional deal on free or reduced shipping costs to test the impact on LED and thermostat sales.	***Not Completed.*** The marketplace doesn't support this change at this time.
Investigate retailers' use of in-store signage and determine opportunities to improve positioning and visibility to potential participants.	***Partially Completed.*** During Q1 of 2020, the program placed new signage for specialty lighting and new measures offered through the program. COVID-19 limited the ability of program staff to go into stores after March 2020.
Identify barriers and potential opportunities for adding program-qualifying appliances.	***Partially Completed***. The program added several new measures for 2020. Program staff viewed 2020 as a test year to understand market opportunities and measure penetration and anticipate focusing on marketing these appliances more heavily during 2021. Program staff also report that CLEAResult will be able to go back into retail stores in 2021 to further assess barriers and opportunities.

2019 Recommendation	Status
Specifically investigate the customer experience with the rebate application process, as well as opportunities to improve communications about that process. As part of the research, investigate modes of communication (such as online and telephone) and identify sources of customer frustration.	***Not Completed***. No primary customer experience research was conducted during 2020. In part, COVID-19 limited the ability of the program to conduct customer research.

Conclusions and Recommendations

CONCLUSION 1: Ongoing marketing and promotions, updates to the IPL Marketplace website platform, and 2020 efforts to lower the final IPL Marketplace purchase prices paid off in increased sales of LEDs, thermostats, and smart strips.

Along with maintaining established marketing activities, key improvements to the IPL Marketplace led to increased sales of core products. IPL and Uplight continued to work closely to increase program awareness and to generate customer interest via flash sales, which IPL provided several times throughout 2020. Following the introduction of the new IPL Marketplace 2.0 platform, IPL noted a higher click rate and more time spent on the IPL Marketplace. There was more than a doubling of LED sales in 2020 over 2019, when IPL lowered the base price of LEDs, and 2020 survey respondents continued to provide less feedback relative to 2018 survey respondents about lowering prices, suggesting that IPL's program changes achieved the desired result.

Uplight and IPL indicated in 2019 that the Demand Response program enrollment rebate helped attract more customers and drive thermostat sales. In 2020, IPL added pre-authorization functionality for Nest thermostats, whereas only Ecobee thermostats had this option previously. While thermostats sales increased by 76% in 2020, Nest thermostat sales increased at a lower rate than Ecobee thermostat sales. If the change contributed to increased IPL Marketplace thermostat sales, the effect was not specific to Nest thermostats.

IPL intends to build upon sales successes by offering product bundles in 2021.

RECOMMENDATION

Design a sales experiment to test the appeal of various measure mixes in the product bundles.

Consider condensing the How it works/buy a thermostat content with the Smart thermostats section of the Demand Response program description

CONCLUSION 2: IPL expanded its measure offerings and diversified savings opportunities. Increasing the promotion of IPL Marketplace rebates for electric heat pump hot water heaters, air purifiers, and dehumidifiers and appliance rebate promotions on new measure offerings can further buffer against the anticipated decline in lighting sales.

In contrast to other products, 2020 sales of heat pump water heaters lagged behind 2019 sales. Uplight added a *Water Heater Buyer's Guide* in 2020, but did not fully integrate the offering onto the IPL Marketplace website; water heaters are not available for direct purchase, potential customers must speak with a contractor beforehand, and the water heater rebate includes installation service, which some people may not want. Therefore, the IPL Marketplace offers water heaters as a service but does not list a water heater category. Water heater sales may be more accessible if offered as a shopping category, alongside other categories.

In 2019 the evaluation team recommended that IPL conduct a benchmarking study of heat pump hot water heater marketing approaches used by other utilities; this project is underway and could inform ongoing strategies to promote hot water heaters through the IPL Marketplace. In 2020, new measures for the Marketplace and appliance rebates such as air purifiers, dehumidifiers, clothes washers and dryers, experienced similarly modest sales. Benchmarking could also be used to inform future marketing approaches for these newer measures.

RECOMMENDATIONS

Consider gauging barriers to purchasing a heat pump water heater through interviewing or surveying contractors, a non-participant survey, or research into alternative sales channels such as contractors through the Efficient Products program or a midstream model.

Conduct a benchmarking study of how other utilities market their air purifier, dehumidifier, washer, dryer and pool pump offerings.

CONCLUSION 3: Customer satisfaction with the IPL Marketplace remains high, but opportunity exists to make incremental improvements.

Customers of all purchase types provided high satisfaction ratings with the 2020 IPL Marketplace. Previous years' customers' suggestions to speed up product delivery did not surface in 2020. On the other hand, some 2020 respondents recommended improving customer service, with an emphasis on improving the ease and speed of the return process. The 2020 survey respondents, particularly thermostat respondents, also suggested increasing product quality, which was bolstered by suggestions to provide additional support to install thermostats. The evaluation team surmises that concerns about product quality for thermostats could be related to installation difficulties, but further information could be collected to confirm this hypothesis. Requests for assistance with installation align with IPL's plans to develop a contractor network for 2021, but other approaches may be possible, such as remote installation support.

RECOMMENDATIONS

Evaluate customer return metrics to identify specific points of improvement, whether speed of resolution, effectiveness of customer service agents or usability of return resources.

Use benchmarking to assess whether installation difficulties drive concerns about product quality, in order to gauge the value of offering some form of installation assistance, whether through the contractor network or through remote installation assistance.

CONCLUSION 4: To determine *ex ante* savings calculations, CLEAResult uses a revised replacement lamp that assumes the 2020 EISA backstop was implemented. Because the EISA 2020 backstop has not gone into effect, the most appropriate baseline remains largely halogen bulbs (until at least 2021).

In confirming *ex ante* savings, the evaluation team determined that CLEAResult used the post-2019 baseline replacement lamp values in their savings calculation. While this aligns with these previous years' reports based on the expected implementation of the EISA 2020 backstop, the Trump administration voided that backstop in 2019, effectively extending the period in which halogen lamps will be available in the retail market. The continued presence of halogens on store shelves across the country and at retailers operating in IPL territory make halogen lamps the most appropriate baseline general service lamp until new rules are promulgated by the U.S. Department of Energy.

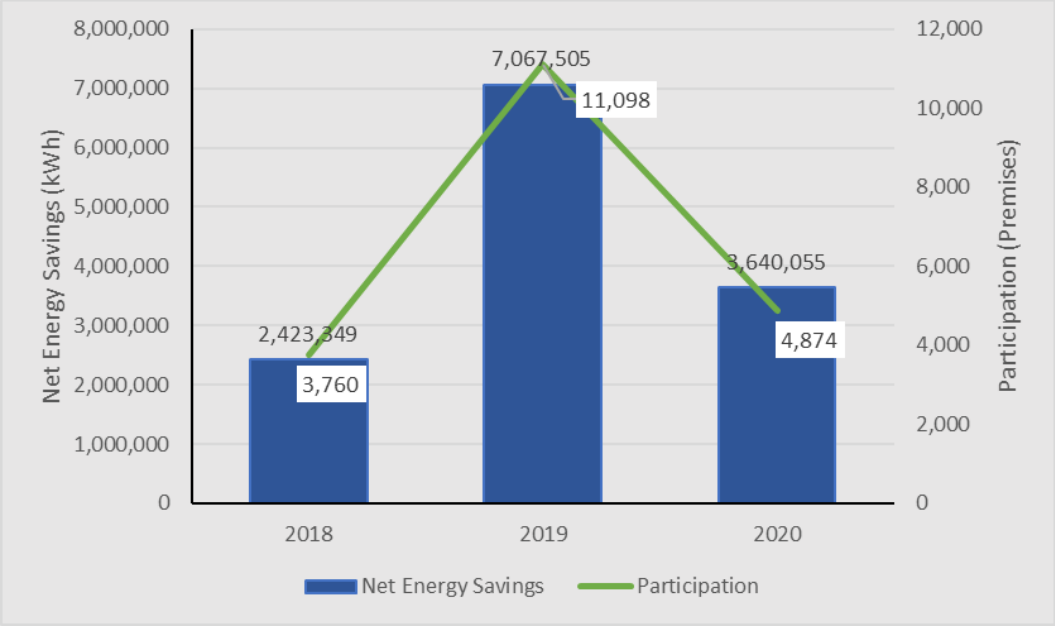
RECOMMENDATION

Continue to use the pre-EISA 2020 baseline lamp values as part of the equation to determine the Lighting and Appliance program's upstream and IPL Marketplace lighting savings until the U.S. Department of Energy provides new guidance.

Multifamily Direct Install Program

Through the Multifamily Direct Install (MFDI) program, IPL customers can save energy through direct install measures, energy-saving kits, and add-on measures. The program implementer, CLEAResult, is responsible for program marketing and outreach, scheduling and conducting the eScore Home Energy Assessments in manufactured homes, distributing kits, and determining customer eligibility for add-on measures. In the first quarter of 2020, the program experienced strong participation and nearly achieved its annual savings goals in March. Then, due to the COVID-19 pandemic, CLEAResult was no longer able to directly install measures at properties and instead pivoted to providing energy-savings kits, which obtained considerable interest from multifamily tenants and manufactured homeowners. The energy-savings kits and early participation enabled the program to achieve substantial savings in a short period of time (Figure 47).

Figure 47. Multifamily Direct Install Program Savings and Participation by Program Year



Sources: Indianapolis Power & Light Company. Year-End DSM Scorecards for 2018, 2019, and 2020; Cadmus. Demand-Side Management Evaluation Report for 2018, 2019

Program Description

The MFDI program serves multifamily and manufactured homes via three channels:

- ***In-unit direct install at multifamily properties.*** For multifamily properties with 12 or more units that are managed by a property management company, IPL works directly with property owners and managers to install measures within each tenant unit on the property at no cost. Installation technicians provide leave-behind educational materials for tenants that include information about the installed measures.
- ***In-home eScore Home Energy Assessment with direct install measures and no-cost weatherization upgrades in manufactured homes.*** During the eScore Home Energy Assessment in a manufactured home, CLEAResult directly installs low-cost measures (listed in Table 119) and

evaluates the property for weatherization upgrades, including air and duct sealing. If a property qualifies, CLEAResult schedules a subsequent visit to install the additional weatherization measures. For manufactured home customers, CLEAResult recommends ways they can save energy and later emails each customer a link to their assessment report, which contains several types of information:

- A summary of the customer home energy use
- Recommendations for actions and energy efficiency upgrades beyond those directly installed during the Home Energy Assessment
- Information about other IPL programs
- Tips and recommendations intended to drive energy-saving behavioral changes

Manufactured home customers are also eligible to receive a free energy-savings kit if they log into the eScore online portal and complete a Home Review.[32] Due to COVID-19, CLEAResult was not able to conduct in-home program audits after March 2020.

- ***Energy-savings kits.*** CLEAResult began 2020 by distributing the Direct Install kit—the same kit as that distributed in prior years—until April 2020, then replaced it with three new kits[33]: (1) the Home Efficiency Starter kit, (2) the Bathroom Refresher kit, and (3) the Tech-Savvy kit. The energy-savings kit measures were the same across three IPL programs (MFDI, IQW, and Whole Home). As noted above, customers must log into the eScore portal and complete a Home Review to receive a kit; then they also receive a home score, designed to encourage them to schedule an eScore Home Energy Assessment and take other corrective energy-efficient actions to improve that score.

Table 119 details the measures provided through direct install during the eScore Home Energy Assessment, as well as energy-savings kit measures and add-on measures for which customers may be eligible.

[32] The Home Review is short survey about customers' home that identifies possible energy-saving opportunities and offers customers the option to receive an energy-saving kit.

[33] This program change was planned prior to the COVID-19 pandemic.

Table 119. 2020 MFDI Program Measures

Direct Install Measures	Kit Measures		Add-On Measures
• 9-watt LED • 16-watt LED • 5-watt globe • 5-watt candelabra • R30 LED • 9-watt exterior LED • Bathroom aerator (1.0 gpm) • Kitchen aerator (1.5 gpm) • Low-flow showerhead (1.5 gpm) • Programmable thermostat • 7-watt LED track light (manufactured home customers only) • Water heater setback (manufactured home customers only)	**Direct Install kit** [a] • LEDs (three 9-watt bulbs) • LED night-light • Bathroom faucet aerator • Furnace whistle **Bathroom Refresher kit** • Furnace whistle • 9-watt LED • 11-watt LED • 16-watt LED • Bathroom faucet aerator • Kitchen aerator • Low-flow showerhead (1.5 gpm) • LED night-light	**Home Efficiency Starter kit** • Furnace whistle • 9-watt LED • 11-watt LED • 16-watt LED • Bathroom faucet aerator • LED night-light **Tech-Savvy kit** • Furnace whistle • 9-watt LED • 11-watt LED • 16-watt LED • Bathroom faucet aerator • LED night-light • Smart strip	• Air sealing • Duct sealing • Refrigerator replacement (multifamily customers only)

Note: This table is based on a MFDI program measure list, which CLEAResult provided to the evaluation team In December 2020.
[a] CLEAResult distributed the Direct Install kit until April 2020, which was the same kit design as used in prior years, then replaced this kit with the three new kits.

IPL offers the MFDI program to all qualifying customers but only claims savings based on electric space cooling and heating and water heating:

- For properties with non-electric space heating, IPL does not claim savings for programmable thermostats
- For properties with non-electric space heating and cooling, IPL does not claim savings for the furnace whistle
- For properties with either non-electric space cooling or non-electric space heating, IPL claims partial savings for the furnace whistle
- For properties with non-electric water heating, IPL does not claim savings for aerators or showerheads

Program Achievements

The program achieved its goals by June 2020, having already achieved 87% of its savings goal by March 2020 (when the COVID-19 pandemic hit). Following pandemic restrictions, CLEAResult quickly pivoted and focused on delivering kits to attain the remaining program goals. Once the program met its goals in June 2020, IPL ceased all program activities.

Program staff attribute the high multifamily participation in 2020 to their outreach efforts with property management associations in 2019. At the start of this triennial cycle, the MFDI program experienced low participation. In response, IPL and CLEAResult re-evaluated their strategies for driving participation, including dedicating more resources to the program and developing new stakeholder engagements and relationships with property management associations and manufactured home communities. By

collaborating with these groups, program staff were able to directly work with property decision-makers to select and prioritize eligible properties to participate.

While multifamily customer participation was high, program staff reported low participation among manufactured home customers in 2020 for several reasons:

- IPL and CLEAResult focused program resources in the first quarter of 2020 on managing the large multifamily pipeline.
- During the third week of March (due to COVID-19), IPL halted all in-person program activities, which are core to the manufactured home offering. These restrictions remained in place for the remainder of 2020.
- Due to uncertainties related to COVID-19, program staff decided not to increase the program goal in March, when it had achieved 87% of its goal.

Research Objectives

The evaluation team conducted process and impact research activities to address three objectives of the 2020 MFDI program evaluation:

- Identify program improvement opportunities
- Calculate program savings
- Assess whether CLEAResult collects proper project documentation and uses appropriate savings algorithms

Research Approach

The evaluation team conducted three activities to answer the research objectives:

- Interviewed IPL and CLEAResult program staff
- Reviewed the program tracking database
- Conducted an engineering review of savings assumptions for all measures (including individual measures within energy-savings kits)

Program Performance

In 2020, IPL achieved 3,640,055 kWh of *ex post* net energy savings and 200 kW of *ex post* net demand reduction, achieving 114% of its net energy-savings goal and 53% of its demand reduction goal (Table 120). This is lower than in 2019 when IPL achieved 125% of its energy-savings goal and 79% of its demand reduction goal.

Table 120. 2020 MFDI Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	3,192,148	3,640,055	114%
Demand Reduction (kW)	380	200	53%
Participation (Unique Premise IDs) [b]	6,944	4,874	70%
Budget	$1,591,313	$1,494,127	94%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

[b] The evaluation team used unique Premise ID from the CLEAResult tracking database to define participants.

Some MFDI participants (n=26) received both an energy-savings kit and direct install measures provided during an eScore Home Energy Assessment or multifamily in-unit direct install visit. Program staff reported that this is intentional and allowed per the program design. However, participants who received an energy-savings kit after receiving an eScore Home Energy Assessment and direct install measures may have more limited savings opportunities—particularly for 9-watt and 16-watt LED bulbs, bathroom and kitchen faucet aerators, and low-flow showerheads.

The IPL scorecards do not count participants who received only energy-savings kits; however, they do include energy savings associated with these kits in the total program savings. The scorecards also do not include direct install measures in the quantity of assessments completed. Table 121 summarizes the *ex post* net program participation based on program offerings.

Table 121. 2020 MFDI Program Participation by Offering

Program Offering	Participants [a]
Multifamily	3,159
Manufactured Homes	35
Energy-Saving Kits	1,652
Total [b]	**4,846**

[a] The evaluation team used unique Premise ID from CLEAResult's tracking database to define participants.

[b] The participation values do not sum to the program measure totals shown in Table 120 due to some missing values in the "Proj Total Num of Units" variable in the tracking data, as well as 26 participants who received both an energy-savings kit and a direct install site visit.

Table 122 summarizes evaluated results including audited, verified, *ex post* gross, and *ex post* net savings for the 2020 MFDI program.

Table 122. 2020 MFDI Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	3,600,559	3,553,633	3,008,409	3,741,181	3,640,055
Demand Reduction (kW)	216	241	122	209	200

To develop the *ex post* net savings from the *ex post* gross results for kits, the evaluation team applied measure-specific NTG values presented in the *Ex Post Net Savings* section. The program realization rates, calculated as *ex post* gross divided by *ex ante* gross, are 104% for energy savings and 97% for

demand reduction (Table 123). The program realization rates are more closely aligned in 2020 than in the 2019 evaluation (104% and 97% in 2020 versus 126% and 71% in 2019) because, rather than using deemed values in the measure characterization file, CLEAResult incorporated some of the *ex post* gross values from the 2019 evaluation.

Table 123. 2020 MFDI Program Realization Rates and Net-to-Gross Summary

Metric	Realization Rate	Freeridership	Spillover	NTG
Energy Savings (kWh)	104%	3%	0%	97%
Demand Reduction (kW)	97%	4%	0%	96%

The evaluation team carried forward the NTG values established in the 2018 evaluation because we did not collect primary data for the 2019 or 2020 evaluations. The team applied a NTG value of 100% to direct install measures for both multifamily and manufactured homes; for the kit measures, the team applied NTGs developed in the 2017 IPL evaluation (see the *Ex Post Net Savings* section for more details).

The evaluation team made adjustments that impacted the energy savings, demand reduction, and realization rates. Lighting measures primarily contributed to the increase in energy savings from *ex ante* to *ex post* gross because CLEAResult used lower baseline wattages than the evaluation team to determine savings values. For more details, see the *Ex Post Gross Savings* section below.

Several factors contributed to the decrease in demand reduction from *ex ante* to *ex post* gross for kit components, primarily the evaluation team's adjustments to savings claimed from kit components and our updated *ex post* gross per-unit savings, specifically for lighting measures. Two additional factors contributed to the decrease in gross demand reduction from *ex ante* to *ex post*:

- The team applied *ex post* savings values to ***furnace whistles*** dependent upon the participant's cooling and heating system fuel types. We assigned demand reduction only to the portion of customers with central AC.
- The team made savings adjustments to ***water savings kit measures*** (bathroom faucet aerators, kitchen faucet aerators, and low-flow showerheads) in cases where energy-savings kits were sent to homes with non-electric water heating.

These approaches are detailed below in the *Verified Savings* section.

The main reason the energy-savings realization rate exceeded 100% and the demand reduction rate did not reach 100% is that the team made energy-savings kit measure adjustments based on fuel and HVAC system types (detailed in the *Verified Savings* section): While the per-unit savings for bathroom faucet aerators, kitchen faucet aerators, low-flow showerheads, and furnace whistles increased overall, these kit measures contribute more to a kit's demand reduction than to its energy savings. For example, the furnace whistle contributes about half the demand reduction for most kits but only about one-fifth of energy savings.

Impact Evaluation

The evaluation team calculated audited, verified gross, *ex post* gross, and *ex post* net energy savings and demand reduction for each measure and for the program overall; each step is detailed in the following subsections.

Audited Savings

The evaluation team reviewed the program tracking database to confirm that the measure quantities align with the program's design and that the deemed values were applied appropriately. During the audit stage, the overall energy savings decreased by 46,942 kWh and the overall demand reduction increased by 24.5 kW. When the evaluation team applied the savings values uniformly, the energy savings decreased by 6,931 kWh and the demand reduction increased by 25.4 kW. The measure quantity adjustments[34] (based on program limits) resulted in decreases of 40,011 kWh and 0.85 kW.

The reason energy savings decreased and demand reduction increased during the audit stage is attributable to the Direct Install kit, as CLEAResult had applied a lower per-unit demand reduction value (0.055 kW) than that deemed (0.1044 kW) for most of these kits. For 11 measures, the deemed values were inconsistently applied in the tracking data.[35] For 10 of those 11 measures, there were just a few cases each where the deemed savings were inconsistently applied (typically these instances had higher per-unit savings than deemed). The Direct Install kit had the most variation, using a lower per-unit demand reduction value than the deemed value for nearly 75% of the cases (n=538). Accordingly, when the evaluation team applied the higher per-unit demand reduction value to all Direct Install kits, the overall demand reduction increased.

Table 124 shows *ex ante* and audited quantities and savings per unit. Audited savings reflect the adjustments described above.

[34] Based on the measure limits provided by CLEAResult, the evaluation team made several quantity adjustments during the audit (where the measure quantities exceeded the program per-premise limits); for multifamily homes, it included 66 bathroom aerators, 43 kitchen aerators, 17 low-flow showerheads, and 28 programmable thermostats, while for manufactured homes it included four bathroom aerators.

[35] These were all Direct Install kit measures; for multifamily homes it included 5-watt LED candelabras, 9-watt LEDs, exterior 9-watt LEDs, low-flow showerheads, and programmable thermostats (for homes with electric heat and a central AC), while for manufactured homes it included 16-watt LEDs, 5-watt LED globes, 9-watt LEDs, bathroom aerators, and low-flow showerheads.

Table 124. 2020 MFDI Program *Ex Ante* and Audited Quantities and Savings

Measure	*Ex Ante* Quantity	*Ex Ante* Savings [a]		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
Multifamily						
9-Watt LED	16,338	19.221	140,288.66	16,338	17.972	133,808.2
16-Watt LED	468	1.499	10,940.25	468	1.451	10,469.16
5-Watt Globe LED	6,916	11.943	87,162.57	6,916	11.757	87,141.60
5-Watt Candelabra LED	895	0.527	3,753.20	895	0.537	3,642.65
9-Watt Exterior LED	1,932	-	31,450.21	1,932	-	31,414.32
R30 LED	3,470	5.992	43,732.52	3,470	5.899	43,732.41
Bathroom Aerator	1,810	5.430	59,024.10	1,744	5.406	56,871.84
Kitchen Aerator	1,563	12.504	191,279.94	1,520	12.312	186,017.60
Low-Flow Showerhead	2,175	36.975	681,775.50	2,158	36.686	676,446.68
Programmable Thermostat (Electric Heat + Central AC)	1,809	-	1,752,987.22	1,781	-	1,726,145.20
Manufactured Homes						
9-Watt LED	183	0.218	1,587.71	183	0.201	1,498.77
16-Watt LED	12	0.040	289.80	12	0.038	280.56
5-Watt Globe LED	38	0.087	528.69	38	0.065	478.80
5-Watt Candelabra LED	46	0.026	187.01	46	0.028	187.22
9-Watt Exterior LED	2	-	32.53	2	-	32.52
R30 LED	6	0.010	75.62	6	0.010	75.62
Bathroom Aerator	22	0.066	719.37	18	0.056	586.98
Kitchen Aerator	11	0.088	1,346.18	11	0.089	1,346.18
Low-Flow Showerhead	24	0.404	7,476.03	24	0.408	7,523.04
Pipe Wrap	30	0.090	668.70	30	0.090	668.70
Programmable Thermostat (Electric Heat + Central AC)	3	-	2,907.59	3	-	2,907.59
Programmable Thermostat (Electric Heat Only)	2	-	1,710.44	2	-	1,710.44
Water Heater Setback	3	0.035	302.42	3	0.035	302.42
Site Visit (Dual Fuel)	1	-	-	1	-	-
Site Visit (Electric)	13	-	-	13	-	-
Duct Sealing (Electric Heat + Central AC) [b]	3	0.684	4,528.76	3	0.684	4,528.76
Duct Sealing (Electric Heat Only) [b]	1	-	12,333.90	1	-	12,333.90
Infiltration Reduction (Electric Heat + Central AC)	3	0.250	2,368.09	3	0.250	2,368.09
Infiltration Reduction (Electric Heat Only)	1	-	2,680.67	1	-	2,680.67
Direct Install Kit [c]	**722**	**48.830**	**151,201.96**	**722**	**75.377**	**151,201.96**
Three 9-Watt LED	-	-	-	-	-	-
LED Night-Light	-	-	-	-	-	-
Bathroom Aerator	-	-	-	-	-	-
Furnace Whistle	-	-	-	-	-	-

Measure	*Ex Ante* Quantity	*Ex Ante* Savings [a]		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
2020 Kits Combined						
9-Watt LED	957	1.075	7,842.29	957	1.053	7,837.83
11-Watt LED	957	1.661	12,119.90	957	1.627	12,115.62
16-Watt LED	956	2.929	21,365.71	956	2.964	21,385.72
LED Night-Light	956	-	13,036.40	956	-	13,036.40
Bathroom Aerator	956	3.003	31,172.29	956	2.964	31,175.16
Kitchen Aerator	331	2.669	40,508.77	331	2.681	40,507.78
Low-Flow Showerhead	331	5.497	103,756.58	331	5.627	103,755.26
Smart Strip	309	8.343	46,350.00	309	8.343	46,350.00
Furnace Whistle	956	46.390	131,067.60	956	46.366	131,067.60
Total	**45,211**	**216**	**3,600,559**	**45,053**	**241**	**3,553,633**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include embedded ISRs.

[b] The evaluation team is unsure of the reason for the difference between *ex ante* and audited savings for the duct sealing measure because the actual conditions were not included in the tracking data and therefore could not be verified. The team requested the actual values on November 23, 2020, and again December 11, 2020, but these were not provided.

[c] The Direct Install kit is presented this way at the audit stage because it is tracked in the database as one measure (although the evaluation team reviewed savings at the measure level).

Verified Savings

To determine verified measure quantities, the evaluation team applied ISRs to audited measure quantities. To calculate verified savings, the team adjusted audited savings by replacing the *ex ante* ISR with the verified ISR. Because the evaluation team did not collect customer survey and ISR primary data in 2020, we used a combination of deemed ISRs from the Indiana TRM (v2.2) and 2016 Pennsylvania TRM and ISRs developed during past IPL evaluations, detailed in Table 125. This is consistent with the 2018 and 2019 evaluation approach.

Table 125. 2020 MFDI Program Measure Installation Rates by Product Type

Product Type [a]	Installation Rate	Source
LEDs (MF)	100%	2016 IPL evaluation (deemed, based on 2016 property manager survey) [b]
LEDs (MH)	98%	2018 IPL evaluation of IQW program (researched) [c]
Showerheads (MF)	75%	2015 IPL evaluation of MFDI program (researched) [d]
Showerheads (MH)	100%	Deemed, based on Indiana TRM (v2.2)
Kitchen Aerators (MF)	80%	2015 IPL evaluation of MFDI program (researched) [d]
Kitchen Aerators (MH)	100%	Deemed, based on Indiana TRM (v2.2)
Bathroom Aerators (MF)	91%	2015 IPL evaluation of MFDI program (researched) [d]
Bathroom Aerators (MH)	100%	Deemed, based on Indiana TRM (v2.2)
Programmable Thermostats (MF)	100%	2016 IPL evaluation (deemed, based on 2016 property manager survey) [e]
Programmable Thermostats (MH)	100%	Deemed, based on Indiana TRM (v2.2)
LEDs (kit)	83%	2018 IPL evaluation of IQW program (researched) [f]

Product Type [a]	Installation Rate	Source
LED Night-Lights (kit)	84%	2017 IPL evaluation of MFDI program (researched) [g]
Bathroom Aerators (kit)	52%	2018 IPL evaluation of IQW program (researched) [c]
Kitchen Aerators (kit)	75%	2015 IPL evaluation of MFDI program (researched) [h]
Showerheads (kit)	80%	2015 IPL evaluation of MFDI program (researched) [h]
Smart Strips (kit)	87%	2018 IPL evaluation of IQW program (researched) [h]
Furnace Whistles (kit)	24%	2018 IPL evaluation of IQW program (researched) [c]

[a] MF = multifamily and MH = manufactured homes

[b] In 2016, the evaluation team surveyed one of two participants in the sample frame whose properties received LEDs; since the responding manager's property accounted for the vast majority of LED installations, we deemed the LED ISR as 100%.

[c] The evaluation team used results from a 2018 survey of IQW participants, given the presumed similarities between customers who are eligible for IQW and those who are eligible for MFDI. IQW is also the proxy we used to determine MFDI NTG values.

[d] Installation rates from the 2015 survey achieved ±3.6% relative precision at 90% confidence.

[e] In 2016, the evaluation team interviewed nine of the 26 property managers who received programmable thermostats and confirmed that they received help with programming during installation. Because most managers had difficulty assessing measure persistence given a lack of knowledge about tenant behaviors (whether tenants override programmed settings), we deemed the programmable thermostat ISR as 100%.

[f] This is the cumulative lifetime ISR that includes adjustments to account for carryover bulbs. The Indiana TRM (v2.2) does not have an up-to-date deemed ISR value for LEDs so the team referenced the 2016 Pennsylvania TRM to establish the first-year ISR.

[g] Installation rates from the 2017 survey achieved ±3.8% relative precision at 90% confidence.

[h] The smart strip, kitchen aerator, and showerhead in the kits use the direct install ISR calculated in previous surveys. The ISR for these measures delivered as a kit component is likely lower than the direct install ISR since the kit relies on the customer to install the measure *and* keep it installed. Direct install ISRs tend to be higher than kit measure ISRs because the contractor installs the measure (and the customer just needs to leave it installed).

Carryover Bulbs

The evaluation team used a carryover bulb approach described in the UMP and consistent with the upstream Lighting and Appliance program to estimate carryover bulbs for MFDI program energy-savings kits. Carryover bulbs are bulbs that were placed in storage during the first program year but installed in subsequent program years. The UMP recommends a 24% trajectory estimation approach, assuming that an additional 24% of the remaining in-storage bulbs are installed in each subsequent year. The team used the initial first-year installation rate, calculated at 67% for kit measures, and extrapolated out the estimated lifetime installation rate for these bulbs using the 24% estimation plus a discount factor to account for the delay in installation. This resulted in a lifetime cumulative installation rate of 83% (shown in Table 126), which the team applied to kit LEDs to account for the future installations of bulbs in storage (instead of applying the originally calculated installation rate).

Table 126. 2020 MFDI Program Adjusted Lifetime Installation Rates for Kit Lighting Measures

Year	Calendar Year	Cumulative ISR
Year 1	2020	67%
Year 2	2021	74%
Year 3	2022	79%
Year 4	**2023**	**83%**

Overall Verified Measure Quantity

To calculate verified quantities, the evaluation team applied the ISRs, including the LED lifetime installation rates we developed to account for carryover bulbs, to the audited *ex ante* measure unit quantities.

CLEAResult does not track kit recipients' space heating and cooling system or water heating system fuel types. Any IPL customer, regardless of their fuel types, receives the same kit contents. In the 2018 evaluation report, the team recommended that IPL and CLEAResult ask customers who complete the eScore Home Review (to receive the kit) about their space and water heating fuel type, then include this information in the program tracking data. We still suggest collecting fuel type details from MFDI participants. For now, customers with non-electric or incompatible systems can still receive a kit but IPL cannot claim energy saving or demand reduction for these kits.

The evaluation team made two adjustments that impacted kit energy savings related to fuel type:

- ***Assigned savings for the bathroom aerator, kitchen aerator, and showerhead to the proportion of participants with an electric water heater.*** CLEAResult does not track water heating fuel types for kit recipients, so determines the program *ex ante* kit savings by assuming that all kit customers have electric water heating. In accordance with the Indiana TRM (v2.2), which states that about 27% of Indiana households use electric water heating, the evaluation team assumed that 27% of customers who received a kit use electric water heating (and therefore we only counted savings for those particular measures from 27% of kit customers).
- ***Applied four verified per-unit savings values for the furnace whistle to account for the proportion of participants with different types of HVAC systems and fuels.*** To determine the *ex ante* savings for furnace whistles, CLEAResult assumed savings from both heating and cooling. However, CLEAResult does not track the occurrence of central AC, heat pumps, or non-electric heating for kit recipients. Accordingly, the team applied four different per-unit savings values to the furnace whistle corresponding to a participant's fuel system types:[36]
  - Electric heating and no central AC: 110.58 kWh and 0 kW
  - Electric heating and central AC: 137.10 kWh and 0.049 kW
  - Non-electric heating and central AC: 36.53 kWh and 0.049 kW
  - Non-electric heating and no central AC: 0 kWh and 0 kW

The resulting verified quantity of 44,261 measures is detailed in Table 127.

[36] Per the Indiana TRM (v2.2), about 63% of Indiana households have central AC and natural gas heating, 4% have a heat pump, 18% have central AC and electric heat, 2% have electric heat and no central AC, and 13% only have natural gas heat.

Table 127. 2020 MFDI Program Audited and Verified Quantities

Measure	Audited Quantity	Installation Rate [a]	Verified Quantity
Multifamily			
9-Watt LED	16,338	100%	16,338
16-Watt LED	468	100%	468
5-Watt Globe LED	6,916	100%	6,916
5-Watt Candelabra LED	895	100%	895
9-Watt Exterior LED	1,932	100%	1,932
R30 LED	3,470	100%	3,470
Bathroom Aerator	1,744	91%	1,586
Kitchen Aerator	1,520	80%	1,216
Low-Flow Showerhead	2,158	75%	1,618
Programmable Thermostat (Electric Heat + Central AC)	1,781	100%	1,781
Manufactured Homes			
9-Watt LED	183	98%	179
16-Watt LED	12	98%	12
5-Watt Globe LED	38	98%	37
5-Watt Candelabra LED	46	98%	45
9-Watt Exterior LED	2	100%	2
R30 LED	6	100%	6
Bathroom Aerator	18	100%	18
Kitchen Aerator	11	100%	11
Low-Flow Showerhead	24	100%	24
Pipe Wrap	30	100%	30
Programmable Thermostat (Electric Heat + Central AC)	3	100%	3
Programmable Thermostat (Electric Heat Only)	2	100%	2
Water Heater Setback	3	100%	3
Site Visit (Dual Fuel)	1	100%	1
Site Visit (Electric)	13	100%	13
Duct Sealing (Electric Heat + Central AC)	3	100%	3
Duct Sealing (Electric Heat Only)	1	100%	1
Infiltration Reduction (Electric Heat + Central AC)	3	100%	3
Infiltration Reduction (Electric Heat Only)	1	100%	1
Direct Install Kit	**722**		
Three 9-Watt LED [b]	2,166	83%	1,798
LED Night-Light	722	84%	606
Bathroom Aerator (Electric) [c]	195	52%	101
Bathroom Aerator (Non-Electric) [c]	527	52%	274
Furnace Whistle (Central AC + Non-Electric Heat) [d]	455	24%	109
Furnace Whistle (Central AC + Electric Heat) [d]	130	24%	31
Furnace Whistle (Electric Heat Only) [d]	14	24%	3
Furnace Whistle (Non-Electric Heat + No Central AC) [d]	123	24%	29

Measure	Audited Quantity	Installation Rate [a]	Verified Quantity
2020 Kits Combined			
9-Watt LED [b]	957	83%	794
11-Watt LED [b]	957	83%	794
16-Watt LED [b]	956	83%	793
LED Night-Light	956	84%	803
Bathroom Aerator (Electric) [c]	258	52%	134
Bathroom Aerator (Non-Electric) [c]	698	52%	363
Kitchen Aerator (Electric) [c]	89	80%	71
Kitchen Aerator (Non-Electric) [c]	242	80%	193
Low-Flow Showerhead (Electric) [c]	89	75%	67
Low-Flow Showerhead (Non-Electric) [c]	242	75%	181
Smart Strip	309	87%	269
Furnace Whistle (Central AC + Non-Electric Heat) [d]	602	24%	145
Furnace Whistle (Central AC + Electric Heat) [d]	172	24%	41
Furnace Whistle (Electric Heat Only) [d]	19	24%	5
Furnace Whistle (Non-Electric Heat + No Central AC) [d]	163	24%	39
Total	**49,663**	**-**	**44,261**

Note: Values rounded for reporting purposes.

[a] The evaluation team has not collected primary data for the MFDI program in recent years. As such, we relied on previously collected ISR information, which is the same approach we took in 2019.

[b] The ISR for the energy savings of the LEDs in the kit is the cumulative lifetime ISR that includes adjustments to account for carryover bulbs through 2023.

[c] The evaluation team adjusted the quantity of bathroom aerators installed from kits based on the 27% incidence rate of electric water heating in Indianapolis per the Indiana TRM (v2.2).

[d] The evaluation team adjusted the quantity of furnace whistles installed from kits based on the incidence rate of HVAC system types per the Indiana TRM (v2.2).

Overall Verified Measure Savings

The team applied the ISRs and measure quantities to calculate verified savings. Table 128 shows the verified savings per measure.

Table 128. 2020 MFDI Program Audited and Verified Savings

Measure	Audited *Ex Ante* Savings [a]		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
Multifamily					
9-Watt LED	17.972	133,808.22	100%	19.943	145,526.42
16-Watt LED	1.451	10,469.16	100%	1.559	11,379.05
5-Watt Globe LED	11.757	87,141.60	100%	12.440	90,794.35
5-Watt Candelabra LED	0.537	3,642.65	100%	0.519	3,790.23
9-Watt Exterior LED	-	31,414.32	100%	-	34,154.09
R30 LED	5.899	43,732.41	100%	6.242	45,554.71
Bathroom Aerator	5.406	56,871.84	91%	4.982	51,718.94
Kitchen Aerator	12.312	186,017.60	80%	9.803	148,817.73
Low-Flow Showerhead	36.686	676,446.68	75%	27.502	507,099.92
Programmable Thermostat (Electric Heat + Central AC)	-	1,726,145.20	100%	-	1,726,136.30
Manufactured Homes					
9-Watt LED	0.201	1,498.77	98%	0.219	1,597.42
16-Watt LED	0.038	280.56	98%	0.041	298.81
5-Watt Globe LED	0.065	478.80	98%	0.067	488.89
5-Watt Candelabra LED	0.028	187.22	98%	0.026	190.91
9-Watt Exterior LED	-	32.52	100%	-	35.36
R30 LED	0.010	75.62	100%	0.011	78.77
Bathroom Aerator	0.056	586.98	100%	0.057	586.93
Kitchen Aerator	0.089	1,346.18	100%	0.089	1,346.21
Low-Flow Showerhead	0.408	7,523.04	100%	0.408	7,523.04
Pipe Wrap	0.090	668.70	100%	0.090	668.70
Programmable Thermostat (Electric Heat + Central AC)	-	2,907.59	100%	-	2,907.59
Programmable Thermostat (Electric Heat Only)	-	1,710.44	100%	-	1,710.44
Water Heater Setback	0.035	302.42	100%	0.035	302.42
Site Visit (Dual Fuel)	-	-	100%	-	-
Site Visit (Electric)	-	-	100%	-	-
Duct Sealing (Electric Heat + Central AC)	0.684	4,528.76	100%	0.684	4,528.76
Duct Sealing (Electric Heat Only)	-	12,333.90	100%	-	12,333.90
Infiltration Reduction (Electric Heat + Central AC)	0.250	2,368.09	100%	0.250	2,368.09
Infiltration Reduction (Electric Heat Only)	-	2,680.67	100%	-	2,680.67
Direct Install Kit [b]	**75.377**	**151,201.96**		**13.186**	**67,069.38**
Three 9-Watt LED	-	-	83%	6.057	46,881.79
LED Night-Light	-	-	84%	-	8,270.20
Bathroom Aerator (Electric)	-	-	52%	0.318	3,305.33
Bathroom Aerator (Non-Electric)	-	-	52%	-	-
Furnace Whistle (Central AC + Non-Electric Heat)	-	-	24%	5.297	3,987.30
Furnace Whistle (Central AC + Electric Heat)	-	-	24%	1.514	4,276.20
Furnace Whistle (Electric Heat Only)	-	-	24%	-	348.55
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	24%	-	-

Measure	Audited *Ex Ante* Savings [a]		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
2020 Kits Combined					
9-Watt LED	1.053	7,837.83	83%	1.014	7,396.70
11-Watt LED	1.627	12,115.62	83%	1.567	11,431.27
16-Watt LED	2.964	21,385.72	83%	2.888	21,078.25
LED Night-Light	-	13,036.40	84%	-	10,950.57
Bathroom Aerator (Electric)	0.800	8,417.29	52%	0.422	4,376.59
Bathroom Aerator (Non-Electric)	2.163	22,757.87	52%	-	-
Kitchen Aerator (Electric)	0.724	10,937.10	80%	0.576	8,749.89
Kitchen Aerator (Non-Electric)	1.957	29,570.68	80%	-	-
Low-Flow Showerhead (Electric)	1.519	28,013.92	75%	1.139	21,010.44
Low-Flow Showerhead (Non-Electric)	4.108	75,741.34	75%	-	-
Smart Strip	8.343	46,350.00	87%	7.258	40,324.50
Furnace Whistle (Central AC + Non-Electric Heat)	29.211	82,572.59	24%	7.014	5,279.59
Furnace Whistle (Central AC + Electric Heat)	8.346	23,592.17	24%	2.004	5,662.12
Furnace Whistle (Electric Heat Only)	0.927	2,621.35	24%	-	461.52
Furnace Whistle (Non-Electric Heat + No Central AC)	7.882	22,281.49	24%	-	-
Total	**241**	**3,553,633**		**122**	**3,008,409**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include embedded ISRs.

[b] The overall kits verified savings is a sum of the individual kit measures (not duplicated in the total verified savings).

Ex Post Gross Savings

The evaluation team calculated 2020 program *ex post* gross per-measure savings using algorithms and variable assumptions from the Indiana TRM (v2.2) and the UMP, similar to the 2018 and 2019 analyses. Discrepancies with LEDs, water heater setbacks, and duct sealing accounted for the greatest differences between *ex ante* and *ex post* assumptions. *Appendix I* presents the algorithms, variable assumptions, and specific references for all program measure *ex post* calculations. It also contains detailed explanations of the differences between *ex ante* and *ex post* savings.

The primary reason for variation between the *ex ante* and the *ex post* gross savings are differences in baseline wattages used to calculate savings for lighting measures (shown in Table 129), followed by high realization rates across lighting measures (see Table 130). CLEAResult used lower baseline wattages in 2020 than in 2019, presumably in anticipation of the EISA backstop, while the evaluation team used the same baseline wattages for both years since the EISA backstop was not implemented. Incandescent bulbs were still available in 2020, so the evaluation team factored incandescent bulb baseline wattages into the *ex post* savings values. The team applied UMP baseline wattages based on a range of 450 lumens to 1,599 lumens. In addition, for the kit LED measures, we applied the Indiana TRM (v2.2) assumption of kit AOH, which results in higher realization rates for kit LEDs versus direct install LEDs. Direct install and kit AOH are provided in *Appendix I*.

Table 129. MFDI Program LED Baseline Wattages

Measure	*Ex Ante*		*Ex Post*	
	2019	2020	2019	2020
9-Watt LED	30.42	20.00	43.00	43.00
16-Watt LED	54.56	46.00	65.00	65.00
5-Watt Globe LED	40.00	20.00	40.00	40.00
5-Watt Candelabra LED	40.00	9.00	40.00	40.00
7-Watt Track LED	29.00	13.00	50.00	50.00
9-Watt Exterior LED	30.42	20.00	43.00	43.00
R30 LED	65.00	24.00	65.00	65.00

For the *ex ante* lighting measure savings, CLEAResult included an embedded ISR, which is lower than the ISR the evaluation team applied in the verified savings step. As noted in the *Verified Savings* section, we have not collected sufficient primary data to calculate ISRs and NTG for the MFDI program during this triennial evaluation period. Accordingly, the team applied ISRs based on past research and deemed values from the Indiana TRM (v2.2). As such, the ISRs applied by the evaluation team, which are mostly 100%, are likely higher than the actual installation rates. The application of different ISRs also contributed to the high realization rates across lighting measures.

The evaluation team could not identify the source of differences between the *ex ante* and *ex post* gross savings for the water heater setback, duct sealing, and the infiltration reduction measures because we did not have the actual conditions in our tracking data extracts.[37] Without actual conditions, the team applied the Indiana TRM (v2.2)–based assumptions, including for the water heater tank size and outlet temperature prior to setback, blower door test values, and the average pre- and post-installation duct distribution efficiencies.

Notably, the electric heat–only duct sealing and the electric heat–only infiltration reduction (at one premise each) had higher *ex ante* savings than the electric heat and central AC duct sealing and infiltration reduction (at three premises each). Since the evaluation team did not have the actual conditions for these cases, we could not assess why the electric heat–only cases resulted in higher savings than the all-electric cases. Since the evaluation team used assumptions from the Indiana TRM (v2.2) to calculate the duct sealing and infiltration reduction *ex post* values, the realization rates for these measures are low.

Table 130 shows a comparison of total *ex ante* deemed savings and total *ex post* gross savings by measure. Applying realization rates by each measure, the table shows savings variations between *ex ante* and *ex post* gross savings.

[37] The evaluation team requested these data fields on November 23, 2020, and again on December 11, 2020.

Table 130. 2020 MFDI Program *Ex Ante* and *Ex Post* Per-Unit Savings

Measure	*Ex Ante* Savings (with Embedded ISRs)		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
Multifamily						
9-Watt LED	19.221	140,288.658	64.465	470,489.50	335%	335%
16-Watt LED	1.499	10,940.246	2.661	19,422.90	178%	178%
5-Watt Globe LED	11.943	87,162.574	28.091	205,019.49	235%	235%
5-Watt Candelabra LED	0.527	3,753.205	3.635	26,531.59	689%	707%
9-Watt Exterior LED	-	31,450.211	-	105,567.18	-	336%
R30 LED	5.992	43,732.523	22.148	161,645.75	370%	370%
Bathroom Aerator	5.430	59,024.100	4.983	51,719.51	92%	88%
Kitchen Aerator	12.504	191,279.940	9.803	148,818.29	78%	78%
Low-Flow Showerhead	36.975	681,775.500	26.864	507,105.94	73%	74%
Programmable Thermostat (Electric Heat + Central AC)	-	1,752,987.215	-	1,726,136.82	-	98%
Manufactured Homes						
9-Watt LED	0.218	1,587.711	0.708	5,164.50	325%	325%
16-Watt LED	0.040	289.802	0.067	488.06	168%	168%
5-Watt Globe LED	0.087	528.689	0.151	1,103.95	174%	209%
5-Watt Candelabra LED	0.026	187.013	0.183	1,336.36	715%	715%
9-Watt Exterior LED	-	32.528	-	109.28	-	336%
R30 LED	0.010	75.618	0.038	279.50	370%	370%
Bathroom Aerator	0.066	719.370	0.057	586.93	86%	82%
Kitchen Aerator	0.088	1,346.180	0.089	1,346.22	101%	100%
Low-Flow Showerhead	0.404	7,476.030	0.399	7,523.13	99%	101%
Pipe Wrap	0.090	668.700	0.076	668.72	85%	100%
Programmable Thermostat (Electric Heat + Central AC)	-	2,907.585	-	2,907.59	-	100%
Programmable Thermostat (Electric Heat Only)	-	1,710.444	-	1,710.44	-	100%
Water Heater Setback	0.035	302.421	0.028	244.69	81%	81%
Site Visit (Dual Fuel)	-	-	-	-	-	-
Site Visit (Electric)	-	-	-	-	-	-
Duct Sealing (Electric Heat + Central AC)	0.684	4,528.756	0.593	5,038.06	-	111%
Duct Sealing (Electric Heat Only)	-	12,333.899	-	924.24	-	-
Infiltration Reduction (Electric Heat + Central AC)	0.250	2,368.090	0.109	1,037.35	-	-
Infiltration Reduction (Electric Heat Only)	-	2,680.673	-	332.67	-	12%
Direct Install Kit	**48.830**	**151,201.96**	**14.223**	**85,332.01**	**29%**	**56%**
Three 9-Watt LED	-	-	7.094	65,144.37	-	-
LED Night-Light	-	-	-	8,270.20	-	-
Bathroom Aerator (Electric)	-	-	0.318	3,305.37	-	-
Bathroom Aerator (Non-Electric)	-	-	-	-	-	-
Furnace Whistle (Central AC + Non-Electric Heat)	-	-	5.297	3,987.30	-	-
Furnace Whistle (Central AC + Electric Heat)	-	-	1.514	4,276.20	-	-
Furnace Whistle (Electric Heat Only)	-	-	-	348.55	-	-
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	-	-	-	-

Measure	*Ex Ante* Savings (with Embedded ISRs)		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
2020 Kits Combined						
9-Watt LED	1.075	7,842.287	3.134	28,782.63	292%	367%
11-Watt LED	1.661	12,119.898	3.872	35,555.01	233%	293%
16-Watt LED	2.929	21,365.705	4.512	41,437.50	154%	194%
LED Night-Light	-	13,036.398	-	10,950.57	-	84%
Bathroom Aerator (Electric)	0.811	8,416.52	0.422	4,376.64	52%	52%
Bathroom Aerator (Non-Electric)	2.192	22,755.77	-	-	0%	0%
Kitchen Aerator (Electric)	0.721	10,937.37	0.576	8,749.93	80%	80%
Kitchen Aerator (Non-Electric)	1.948	29,571.40	-	-	0%	0%
Low-Flow Showerhead (Electric)	1.484	28,014.28	1.113	21,010.69	75%	75%
Low-Flow Showerhead (Non-Electric)	4.013	75,742.31	-	-	0%	0%
Smart Strip	8.343	46,350.000	7.258	40,324.50	87%	87%
Furnace Whistle (Central AC + Non-Electric Heat)	29.226	82,572.59	7.014	5,279.59	24%	6%
Furnace Whistle (Central AC + Electric Heat)	8.350	23,592.17	2.004	5,662.12	24%	24%
Furnace Whistle (Electric Heat Only)	0.928	2,621.35	-	461.52	0%	18%
Furnace Whistle (Non-Electric Heat + No Central AC)	7.886	22,281.49	-	-	0%	0%
Total	**216**	**3,600,559**	**209**	**3,741,181**	**97%**	**104%**

Note: Values rounded for reporting purposes.

[a] The overall *ex post* gross savings for kits is a sum of the individual measures listed in this table. This sum does not equal the total *ex post* gross savings amounts.

Table 131 shows program *ex ante* reported savings, audited savings, verified savings, and *ex post* gross demand reduction, and Table 132 shows the same details for energy savings.

Table 131. 2020 MFDI Program *Ex Ante* and *Ex Post* Peak Demand Reduction (kW)

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
Multifamily				
9-Watt LED	19.221	17.972	19.943	64.465
16-Watt LED	1.499	1.451	1.559	2.661
5-Watt Globe LED	11.943	11.757	12.440	28.091
5-Watt Candelabra LED	0.527	0.537	0.519	3.635
9-Watt Exterior LED	-	-	-	-
R30 LED	5.992	5.899	6.242	22.148
Bathroom Aerator	5.430	5.406	4.982	4.983
Kitchen Aerator	12.504	12.312	9.803	9.803
Low-Flow Showerhead	36.975	36.686	27.502	26.864
Programmable Thermostat (Electric Heat + Central AC)	-	-	-	-

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
Manufactured Homes				
9-Watt LED	0.218	0.201	0.219	0.708
16-Watt LED	0.040	0.038	0.041	0.067
5-Watt Globe LED	0.087	0.065	0.067	0.151
5-Watt Candelabra LED	0.026	0.028	0.026	0.183
9-Watt Exterior LED	-	-	-	-
R30 LED	0.010	0.010	0.011	0.038
Bathroom Aerator	0.066	0.056	0.057	0.057
Kitchen Aerator	0.088	0.089	0.089	0.089
Low-Flow Showerhead	0.404	0.408	0.408	0.399
Pipe Wrap	0.090	0.090	0.090	0.076
Programmable Thermostat (Electric Heat + Central AC)	-	-	-	-
Programmable Thermostat (Electric Heat Only)	-	-	-	-
Water Heater Setback	0.035	0.035	0.035	0.028
Site Visit (Dual Fuel)	-	-	-	-
Site Visit (Electric)	-	-	-	-
Duct Sealing (Electric Heat + Central AC)	0.684	0.684	0.684	0.593
Duct Sealing (Electric Heat Only)	-	-	-	-
Infiltration Reduction (Electric Heat + Central AC)	0.250	0.250	0.250	0.109
Infiltration Reduction (Electric Heat Only)	-	-	-	-
Direct Install Kit [b]	**48.830**	**75.377**	**13.186**	**14.223**
Three 9-Watt LED	-	-	6.057	7.094
LED Night-Light	-	-	-	-
Bathroom Aerator (Electric)	-	-	0.318	0.318
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC + Non-Electric Heat)	-	-	5.297	5.297
Furnace Whistle (Central AC + Electric Heat)	-	-	1.514	1.514
Furnace Whistle (Electric Heat Only)	-	-	-	-
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	-	-
2020 Kits Combined				
9-Watt LED	1.075	1.053	1.014	3.134
11-Watt LED	1.661	1.627	1.567	3.872
16-Watt LED	2.929	2.964	2.888	4.512
LED Night-Light	-	-	-	-
Bathroom Aerator (Electric)	0.811	0.800	0.422	0.422
Bathroom Aerator (Non-Electric)	2.192	2.163	-	-
Kitchen Aerator (Electric)	0.721	0.724	0.576	0.576
Kitchen Aerator (Non-Electric)	1.948	1.957	-	-
Low-Flow Showerhead (Electric)	1.484	1.519	1.139	1.113
Low-Flow Showerhead (Non-Electric)	4.013	4.108	-	-
Smart Strip	8.343	8.343	7.258	7.258
Furnace Whistle (Central AC + Non-Electric Heat)	29.226	29.211	7.014	7.014
Furnace Whistle (Central AC + Electric Heat)	8.350	8.346	2.004	2.004

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
Furnace Whistle (Electric Heat Only)	0.928	0.927	-	-
Furnace Whistle (Non-Electric Heat + No Central AC)	7.886	7.882	-	-
Total	**216**	**241**	**122**	**209**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include embedded ISRs.

[b] The overall *ex post* gross savings for kits is a sum of the individual measures listed in this table. This sum does not equal the total *ex post* gross savings amounts.

Table 132. 2020 MFDI Program *Ex Ante* and *Ex Post* Gross Electric Energy Savings (kWh)

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Multifamily				
9-Watt LED	140,288.66	133,808.22	145,526.42	470,489.50
16-Watt LED	10,940.25	10,469.16	11,379.05	19,422.90
5-Watt Globe LED	87,162.57	87,141.60	90,794.35	205,019.49
5-Watt Candelabra LED	3,753.20	3,642.65	3,790.23	26,531.59
9-Watt Exterior LED	31,450.21	31,414.32	34,154.09	105,567.18
R30 LED	43,732.52	43,732.41	45,554.71	161,645.75
Bathroom Aerator	59,024.10	56,871.84	51,718.94	51,719.51
Kitchen Aerator	191,279.94	186,017.60	148,817.73	148,818.29
Low-Flow Showerhead	681,775.50	676,446.68	507,099.92	507,105.94
Programmable Thermostat (Electric Heat + Central AC)	1,752,987.22	1,726,145.20	1,726,136.30	1,726,136.82
Manufactured Homes				
9-Watt LED	1,587.71	1,498.77	1,597.42	5,164.50
16-Watt LED	289.80	280.56	298.81	488.06
5-Watt Globe LED	528.69	478.80	488.89	1,103.95
5-Watt Candelabra LED	187.01	187.22	190.91	1,336.36
9-Watt Exterior LED	32.53	32.52	35.36	109.28
R30 LED	75.62	75.62	78.77	279.50
Bathroom Aerator	719.37	586.98	586.93	586.93
Kitchen Aerator	1,346.18	1,346.18	1,346.21	1,346.22
Low-Flow Showerhead	7,476.03	7,523.04	7,523.04	7,523.13
Pipe Wrap	668.70	668.70	668.70	668.72
Programmable Thermostat (Electric Heat + Central AC)	2,907.59	2,907.59	2,907.59	2,907.59
Programmable Thermostat (Electric Heat Only)	1,710.44	1,710.44	1,710.44	1,710.44
Water Heater Setback	302.42	302.42	302.42	244.69
Site Visit (Dual Fuel)	-	-	-	-
Site Visit (Electric)	-	-	-	-
Duct Sealing (Electric Heat + Central AC)	4,528.76	4,528.76	4,528.76	5,038.06
Duct Sealing (Electric Heat Only)	12,333.90	12,333.90	12,333.90	924.24
Infiltration Reduction (Electric Heat + Central AC)	2,368.09	2,368.09	2,368.09	1,037.35
Infiltration Reduction (Electric Heat Only)	2,680.67	2,680.67	2,680.67	332.67

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Direct Install Kit [b]	**151,201.96**	**151,201.96**	**67,069.38**	**85,332.01**
Three 9-Watt LED	-	-	46,881.79	65,144.37
LED Night-Light	-	-	8,270.20	8,270.20
Bathroom Aerator (Electric)	-	-	3,305.33	3,305.37
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC + Non-Electric Heat)	-	-	3,987.30	3,987.30
Furnace Whistle (Central AC + Electric Heat)	-	-	4,276.20	4,276.20
Furnace Whistle (Electric Heat Only)	-	-	348.55	348.55
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	-	-
2020 Kits Combined				
9-Watt LED	7,842.29	7,837.83	7,396.70	28,782.63
11-Watt LED	12,119.90	12,115.62	11,431.27	35,555.01
16-Watt LED	21,365.71	21,385.72	21,078.25	41,437.50
LED Night-Light	13,036.40	13,036.40	10,950.57	10,950.57
Bathroom Aerator (Electric)	8,416.52	8,417.29	4,376.59	4,376.64
Bathroom Aerator (Non-Electric)	22,755.77	22,757.87	-	-
Kitchen Aerator (Electric)	10,937.37	10,937.10	8,749.89	8,749.93
Kitchen Aerator (Non-Electric)	29,571.40	29,570.68	-	-
Low-Flow Showerhead (Electric)	28,014.28	28,013.92	21,010.44	21,010.69
Low-Flow Showerhead (Non-Electric)	75,742.31	75,741.34	-	-
Smart Strip	46,350.00	46,350.00	40,324.50	40,324.50
Furnace Whistle (Central AC + Non-Electric Heat)	82,572.59	82,572.59	5,279.59	5,279.59
Furnace Whistle (Central AC + Electric Heat)	23,592.17	23,592.17	5,662.12	5,662.12
Furnace Whistle (Electric Heat Only)	2,621.35	2,621.35	461.52	461.52
Furnace Whistle (Non-Electric Heat + No Central AC)	22,281.49	22,281.49	-	-
Total	**3,600,559**	**3,553,633**	**3,008,409**	**3,741,181**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings include embedded ISRs.

[b] The overall *ex post* gross savings for kits is a sum of the individual measures listed in this table. This sum does not equal the total *ex post* gross savings amounts.

Ex Post Net Savings

Ex post net reflects savings that are attributable to the program after adjusting for freeridership and spillover, resulting in an NTG estimate. In 2018, the evaluation team gathered data from multifamily property managers and manufactured home participants. However, due to low program participation, the sample size was too limited to calculate a reliable NTG estimate. Since 2018, the team has not collected any primary data for MFDI, and therefore we relied on assumptions to calculate *ex post* net savings.

Multifamily Direct Install Measures

The team applied a 100% NTG to all 2020 MFDI measures (consistent with previous MFDI evaluations since 2015). The evaluation team assumed that, absent the program, property managers would not have

purchased and installed measures provided by the program and within the same time period and volume.[38]

Manufactured Home Direct Install Measures

Since measures for the manufactured homes are also direct install, the evaluation team also assumed a 100% NTG for manufactured home measures. Participant interviews conducted in 2018 support this approach. While limited in number, participant interviewees said they have low incomes and would not have installed any of the same measures without the program.[39]

Kit Measures

To calculate net energy savings and demand reduction for kit measures, the evaluation team applied NTGs developed in the 2017 IPL evaluation[40] to the *ex post* gross savings. Table 133 shows the resulting *ex post* net energy savings and demand reduction for 2020.

Table 133. 2020 MFDI Program *Ex Post* Net Savings and Net Reduction

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
Multifamily					
9-Watt LED	64.465	470,489.50	100%	64.465	470,489.50
16-Watt LED	2.661	19,422.90	100%	2.661	19,422.90
5-Watt Globe LED	28.091	205,019.49	100%	28.091	205,019.49
5-Watt Candelabra LED	3.635	26,531.59	100%	3.635	26,531.59
9-Watt Exterior LED	-	105,567.18	100%	-	105,567.18
R30 LED	22.148	161,645.75	100%	22.148	161,645.75
Bathroom Aerator	4.983	51,719.51	100%	4.983	51,719.51
Kitchen Aerator	9.803	148,818.29	100%	9.803	148,818.29
Low-Flow Showerhead	26.864	507,105.94	100%	26.864	507,105.94
Programmable Thermostat (Electric Heat + Central AC)	-	1,726,136.82	100%	-	1,726,136.82

[38] This approach assumes that tenants also would not have installed any measures on their own. In 2016, the evaluation team recommended that IPL conduct tenant research to confirm or update this implied assumption about tenant behavior.

[39] Programs for low-income customers often assume 100% NTGs because the customers' limited financial resources make it less likely that they would have made the energy-saving upgrades without program assistance.

[40] The team developed kit NTGs in the 2017 evaluation based on self-report responses from a participant survey. We applied a 100% NTG to the furnace whistle, which was not included in the 2017 kits and therefore did not have a previously calculated NTG and is not a readily accessible product.

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
Manufactured Homes					
9-Watt LED	0.708	5,164.50	100%	0.708	5,164.50
16-Watt LED	0.067	488.06	100%	0.067	488.06
5-Watt Globe LED	0.151	1,103.95	100%	0.151	1,103.95
5-Watt Candelabra LED	0.183	1,336.36	100%	0.183	1,336.36
9-Watt Exterior LED	-	109.28	100%	-	109.28
R30 LED	0.038	279.50	100%	0.038	279.50
Bathroom Aerator	0.057	586.93	100%	0.057	586.93
Kitchen Aerator	0.089	1,346.22	100%	0.089	1,346.22
Low-Flow Showerhead	0.399	7,523.13	100%	0.399	7,523.13
Pipe Wrap	0.076	668.72	100%	0.076	668.72
Programmable Thermostat (Electric Heat + Central AC)	-	2,907.59	100%	-	2,907.59
Programmable Thermostat (Electric Heat Only)	-	1,710.44	100%	-	1,710.44
Water Heater Setback	0.028	244.69	100%	0.028	244.69
Site Visit (Dual Fuel)	-	-	100%	-	-
Site Visit (Electric)	-	-	100%	-	-
Duct Sealing (Electric Heat + Central AC)	0.593	5,038.06	100%	0.593	5,038.06
Duct Sealing (Electric Heat Only)	-	924.24	100%	-	924.24
Infiltration Reduction (Electric Heat + Central AC)	0.109	1,037.35	100%	0.109	1,037.35
Infiltration Reduction (Electric Heat Only)	-	332.67	100%	-	332.67
Direct Install Kit					
Three 9-Watt LED	7.094	65,144.37	55%	3.901	35,829.41
LED Night-Light	-	8,270.20	12%	-	992.42
Bathroom Aerator (Electric)	0.318	3,305.37	5%	0.016	165.27
Bathroom Aerator (Non-Electric)	-	-	5%	-	-
Furnace Whistle (Central AC + Non-Electric Heat)	5.297	3,987.30	100%	5.297	3,987.30
Furnace Whistle (Central AC + Electric Heat)	1.514	4,276.20	100%	1.514	4,276.20
Furnace Whistle (Electric Heat Only)	-	348.55	100%	-	348.55
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	100%	-	-
2020 Kits Combined					
9-Watt LED	3.134	28,782.63	55%	1.724	15,830.44
11-Watt LED	3.872	35,555.01	55%	2.129	19,555.25
16-Watt LED	4.512	41,437.50	55%	2.482	22,790.62
LED Night-Light	-	10,950.57	12%	-	1,314.07
Bathroom Aerator (Electric)	0.422	4,376.64	5%	0.021	218.83
Bathroom Aerator (Non-Electric)	-	-	5%	-	-
Kitchen Aerator (Electric)	0.576	8,749.93	100%	0.576	8,749.93
Kitchen Aerator (Non-Electric)	-	-	100%	-	-
Low-Flow Showerhead (Electric)	1.113	21,010.69	100%	1.113	21,010.69
Low-Flow Showerhead (Non-Electric)	-	-	100%	-	-
Smart Strip	7.258	40,324.50	100%	7.258	40,324.50
Furnace Whistle (Central AC + Non-Electric Heat)	7.014	5,279.59	100%	7.014	5,279.59
Furnace Whistle (Central AC + Electric Heat)	2.004	5,662.12	100%	2.004	5,662.12
Furnace Whistle (Electric Heat Only)	-	461.52	100%	-	461.52

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
Furnace Whistle (Non-Electric Heat + No Central AC)	-	-	100%	-	-
Total	**209**	**3,741,181**		**200**	**3,640,055**

Note: Values rounded for reporting purposes.

Process Evaluation

For the process evaluation, the evaluation team interviewed IPL and CLEAResult program staff and reviewed program tracking data and program marketing materials, including the program website.

Changes to Program Design

In April 2020, IPL released three new energy-savings kits to provide customers with additional options to fit their household needs[41]. The base contents of these kits are similar to the previous kit—three LED bulbs, a night-light, an aerator, and a furnace whistle—with additional items included in two of the new kits (Table 119 lists the full measures for each kit offering).

2020 Program Highlights

The program staff's outreach efforts with property management associations in 2019 resulted in high multifamily participation in 2020. Program staff strategically planned multifamily projects that led to the program achieving nearly 90% of its goals by the end of the first quarter.

At the start of this triennial cycle, the MFDI program experienced low participation. In response, IPL and CLEAResult re-evaluated their strategies for driving participation, including dedicating more resources to the program and developing new stakeholder engagement and relationships with property management associations and manufactured home communities. Program staff noted that engaging property management groups (like the Indiana Apartment Association) helped them to develop a strong pipeline going into 2020. By collaborating with these groups, program staff were able to directly work with property decision-makers to select and prioritize eligible properties to participate.

2020 Program Challenges

IPL and CLEAResult program staff noted two 2020 challenges:

- ***The impact of COVID-19 on serving homes.*** Although the program was able to achieve its goals by June, the COVID-19 pandemic did impact CLEAResult's ability to serve the manufactured home sector. In addition, some multifamily projects were only partially completed when IPL's restricted in-person work, so some units at these projects did not receive the direct install measures as planned. Program staff said property owners and managers were understanding of the hard stop. While program staff have tried to stay in contact with these property owners,

[41] This program change was planned prior to the COVID-19 pandemic.

some communication has fizzled with time (and because the program achieved its goals early in the year).

- ***Low manufactured home participation.*** This sector continued to experience low participation in 2020, largely due to COVID-19 restrictions with in-home assessments. In general, the manufactured home sector has been more challenging to engage, in part because the program staff must first gain the trust of residents and in part because it has been difficult to coordinate work within the communities' hours of operation.

  In 2019, program staff implemented several strategies to engage this sector, including collaborating with community owners and managers and hosting events on the site to interact with residents. In 2020, program staff refined this strategy by having a small team of eScore home energy assessors, with branded vans, go door-to-door in a manufactured home community and leave program marketing materials behind when residents were not home. However, since the program resources were focused on the multifamily pipeline in the first quarter of 2020, then COVID-19 happened, the program staff were never able to fully launch the manufactured home outreach efforts. In 2021 staff plan to serve the manufactured homes sector similarly to other single-family residents: through the Efficient Products (launched in 2021) and IQW programs.

Follow-Up on 2019 Evaluation Recommendations

The evaluation team followed up with IPL program staff on the recommendations we made during the 2019 evaluation; the status of each is shown in Table 134.

Table 134. 2019 MFDI Program Recommendation Status

2019 Recommendation	2020 Follow Up
Clearly document the correct per-unit deemed savings values across all sources and update this value as any changes are made. (Savings values varied between documentation and the participation data, making it unclear which *ex ante* savings value to reference.)	***In progress.*** IPL had met 87% of its 2020 MFDI program goal by March, prior to receiving these 2019 evaluation recommendations. CLEAResult plans to incorporate available data tracking updates into the 2021 delivery and provide details to the evaluation team in time for the 2021 evaluation.
Consistently apply installation rates to per-unit measure assumptions. Use the updated 2019 *ex post* savings values and per-measure installation rates for the next program cycle.	
Troubleshoot or conduct quality control for key specifications of data entry, including efficiency levels, home fuel types, and number of measures installed. Only allow certain options once a measure is selected (for example, if a smart thermostat with a central AC is selected, only allow the central AC option as the cooling source). Document unique situations to further assist with quality control efforts. Provide all tracked data to the evaluation team, as available, to inform the *ex post* analysis.	
If exceptions are allowed, include language and rationale for those exceptions in the next operating plan. Develop data tracking metrics that can be used for verification when program limits are exceeded.	

2019 Recommendation	2020 Follow Up
Ensure that the tracking data contains a single line with the total quantity by measure. This will help to reduce the uncertainty related to duplicate data.	
For new data fields collected in 2020, such as number of bathrooms, provide all tracked data to the evaluation team to inform the *ex post* analysis.	
Include a tracking data field for multifamily units to distinguish whether they are commercially or individually metered.	***In progress.*** CLEAResult added a new field for this detail, but it does not appear in the evaluation team's tracking data extract.
Develop a tracking data flag for customers who received an in-home assessment and send these customers a kit with measures that were not included in the direct install visit.	***Not completed.*** IPL had met most of its 2020 MFDI program goal prior to receiving 2019 evaluation recommendations. CLEAResult plans to incorporate available data tracking updates into the 2021 delivery and provide details to the evaluation team in time for the 2021 evaluation. In addition, program staff delayed making changes to the direct install portion of the program since they needed to postpone in-person program activities due to the COVID-19 pandemic.
Re-evaluate which measures should be included in the direct install portion and which should be added to the kits based on what measures customers are most likely to install on their own. For example, the furnace whistle has the lowest ISR of all kit measures, yet creates a large portion of the kit savings; this ISR would likely be higher if furnace whistles were a direct install measure.	***In progress.*** In April 2020, IPL released three new energy-savings kits to provide customers with additional options to fit their household needs. The base contents of these kits are similar to the previous kit—three LED bulbs, a night-light, an aerator, and a furnace whistle—with additional items included in two of the new kits. These kit variations still include furnace whistles (despite the low ISR) and furnace whistles were not added as a direct install measure.
Assess whether additional kit measures, not provided during the direct install visit, may provide savings. Examples could include pipe insulation or hot water heater blankets.	***Not completed.*** IPL met most of its 2020 MFDI program goal prior to receiving 2019 evaluation recommendations. CLEAResult plans to incorporate available data tracking updates into the 2021 delivery and provide details to the evaluation team in time for the 2021 evaluation. In addition, program staff delayed making changes to the direct install program since they need to postpone in-person program activities due to the COVID-19 pandemic.

Conclusions and Recommendations

CONCLUSION 1: IPL met its MFDI program energy-savings goals by June 2020, in large part due to the healthy pipeline of multifamily projects developed by CLEAResult during 2019.

IPL staff reported that, in the first quarter of 2020, the program experienced high multifamily participation due to the project pipeline CLEAResult developed during 2019. By the end of March 2020, the program had already achieved 87% of its savings goals because of high participation from this sector.

At the start of this triennial cycle in 2018, the MFDI program experienced relatively low participation. In 2019, IPL and CLEAResult re-evaluated their strategies for driving participation, including dedicating more resources to the program and developing new stakeholder engagement and new relationships

with property management associations and manufactured home communities. Program staff attribute the high multifamily participation in 2020 to these outreach efforts. Program staff noted that engaging property management groups, like the Indiana Apartment Association, helped them to develop a strong pipeline during the fourth quarter of 2019 and into 2020. By collaborating with these groups, program staff were able to directly engage with property decision-makers to select and prioritize eligible properties to participate.

CONCLUSION 2: In 2020, the MFDI program energy-savings realization rate exceeded 100%, while the demand reduction realization rate did not reach 100%. While the difference between these realization rates has diminished since 2018, it is still being caused by a range of factors (most notably, inconsistent input collection and unclear source documentation).

The overall energy-savings realization rate was 104% in 2020 compared to 126% in 2019 and 121% in 2018. The overall demand reduction realization rate increased to 97% in 2020 compared to 71% in 2019 and 86% in 2018. The evaluation team made calculation adjustments that impacted the energy savings, demand reduction, and realization rates. Several factors contributed to the decrease in demand reduction from *ex ante* to *ex post* gross for kit components:

- ***Actual inputs for measures with custom savings were missing from the available program data.*** The evaluation team could not identify the source of differences between the *ex ante* and *ex post* gross savings for the water heater setback, duct sealing, and infiltration reduction measures because the actual conditions were not provided in the program tracking data extracts.[42] In these instances, the team applied the Indiana TRM (v2.2)–based assumptions, including for the water heater outlet temperature prior to setback, blower door test values, and the average pre- and post-installation duct distribution efficiencies; this resulted in lower *ex post* savings for these measures.
- ***CLEAResult and the evaluation team used different baseline wattages in the savings calculations.*** Lighting measures primarily contributed to the increase in gross energy savings from *ex ante* to *ex post*. CLEAResult used lower baseline wattages in 2020 than in 2019, presumably in anticipation of the EISA backstop, while the evaluation team used the same baseline wattages for both years since the EISA backstop was not implemented. Incandescent bulbs were still available in 2020, so the evaluation team factored halogen bulbs baseline wattages into the *ex post* savings values.
- ***Embedded ex ante ISRs for lighting measures contributed to lower overall ex ante savings.*** To determine *ex ante* savings for lighting measures, CLEAResult included an embedded ISR (either 92% or 96%), which is lower than the ISR the evaluation team applied to determine verified savings. As noted in the *Verified Savings* section, the team has not collected sufficient primary data to calculate ISRs and NTG for the MFDI program during this triennial evaluation period.
- ***HVAC system fuel type information was not tracked for customers who received furnace whistles.*** The team applied different *ex post* savings values to furnace whistles to reflect the fuel types of participant's cooling and heating systems. The evaluation team assigned demand

[42] The evaluation team requested these data fields on November 23, 2020, and again December 11, 2020.

reduction only to the portion of customers with central AC (as detailed in the *Verified Savings* section).

- ***Water heating fuel type was not tracked for customers who received water savings measures in their energy-saving kit.*** The evaluation team made savings adjustments to bathroom faucet aerators, kitchen faucet aerators, and low-flow showerheads in cases where energy-saving kits were sent to homes with non-electric water heating (as detailed in the *Verified Savings* section).

RECOMMENDATIONS

Similar to recommendations made in the 2018 and 2019 evaluations, identify and implement a solution to address the issues caused by not tracking water heating and HVAC system fuel types for energy-saving kit recipients. For example, eScore survey respondents could answer details about their water heater and HVAC system fuel types. To help customers accurately convey information about their systems, the survey could provide information (and include example images) to help customers identify their systems. For example:

- Natural gas water heaters typically have a big flue on top that vents outside (show picture).
- Natural gas heating systems can cause higher gas bills in the winter than in the summer.

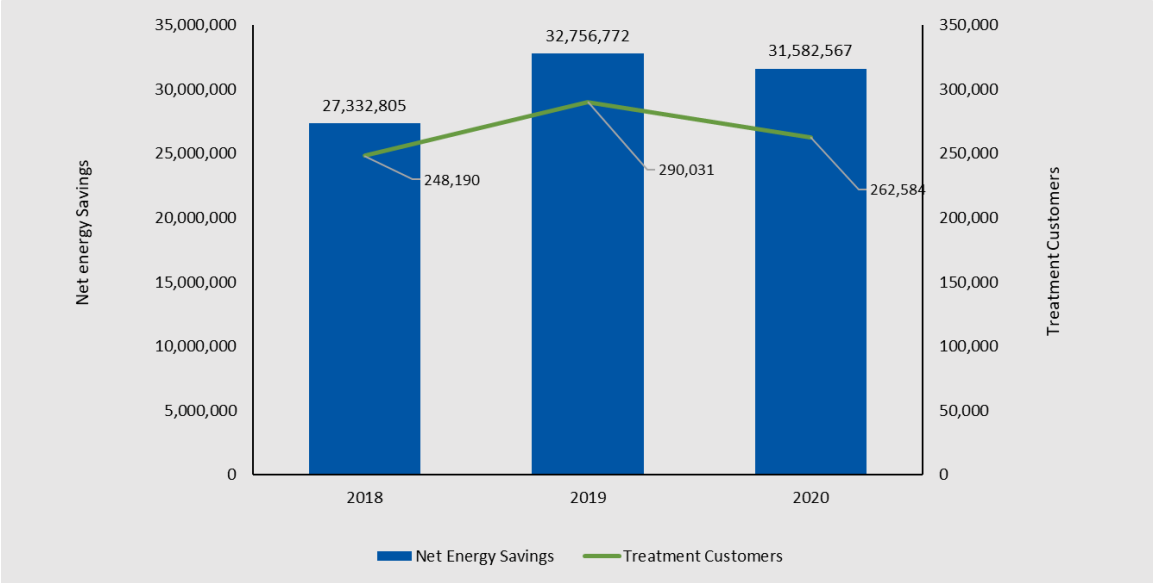
Similar to recommendations made in the 2018 and 2019 evaluations, clearly document the source of variable assumptions for baseline wattages and WHFs for LED measures along with the correct per-unit savings across all sources. Update values as any changes are made.

Coordinate with evaluation team regarding the appropriate lighting baseline to use for LEDs distributed through kits. Due to the fast-changing lighting market, a new baseline may be appropriate.

Peer Comparison Program

Since 2012, IPL has delivered home energy reports to randomly selected IPL customers. Oracle, the Peer Comparison program implementer, has produced the home energy report content and distributed the reports in waves since program inception. The program achieved an energy-savings realization rate of 97%, with performance largely driven by significant savings in waves 1, 2, and 3, which accounted for 66% of total program savings. The program did not suspend operations during the COVID-19 pandemic, though Oracle adjusted report messaging slightly to provide tips for saving energy while at home. Neither the evaluation team nor Oracle could identify impacts of the pandemic on program savings. Figure 48 shows the program's savings and number of treated customers from 2018 to 2020.

Figure 48. Peer Comparison Savings and Treatment Customers, 2018-2020



Program Description

By the end of 2020, 262,584 of IPL's nearly 450,000 residential customers had received home energy reports. The mailed reports provide customers with information on their home energy consumption and encourage them to adopt energy-saving home improvements and practices. Tailored to each customer's household energy-use data, the reports provide comparisons to neighbors' energy use along with personalized energy-saving tips. Customers with a valid email address also receive a monthly copy of the home energy reports by email and can access the program-affiliated web portal for more information on saving energy.

Not all IPL customers receive home energy reports, but all customers have access to IPL's energy usage web portal, which is branded as Powerview. Oracle used a randomized controlled trial to randomly assign customers to a treatment group (home energy report recipients) or a control group (nonrecipients). Oracle did not inform the control group customers of home energy reports or

treatment group customers of the program's experimental design. Theoretically, the randomization process considers treatment and control group customers as equivalents; therefore, the evaluation team attributed differences between the groups' energy use (following receipt of the home energy reports) to program intervention.

Oracle further divides the customer population into waves, defined by the year in which the customer began receiving home energy reports. Between the 2012 and 2020 program years, IPL had launched 10 waves. IPL added one wave of new treatment and control groups in May 2020 to diminish the effect of treatment customer attrition over time. Table 135 shows the number of active treatment and control customers at the start of the 2020 program year. Although the combination of treatment and control customers is approaching IPL's total residential customer base, roughly 31% of that base remains to build adequately sized treatment and control groups for a future wave (to account for attrition).

Table 135. 2020 Peer Comparison Program Design

Wave and Year	Treatment Delivery Frequency [a]	Number of Customers	
		Treatment	Control
Wave 1 – 2012	Four print reports; 12 electronic reports; web portal access; HBA	15,375	9,092
Wave 2 – 2013	Four print reports; 12 electronic reports; web portal access; HBA	29,862	8,833
Wave 3 – 2014	Four print reports; 12 electronic reports; web portal access; HBA	82,464	9,028
Wave 4 – 2015	Four print reports; 12 electronic reports; web portal access; HBA	3,206	2,840
Wave 5 – 2016	Four print reports; 12 electronic reports; web portal access; HBA	11,049	3,746
Wave 6 – 2016	Four print reports; 12 electronic reports; web portal access; HBA	13,649	4,647
Wave 7 – 2017	Four print reports; 12 electronic reports; web portal access; HBA	30,054	10,188
Wave 8 – 2019	Four print reports; 12 electronic reports; web portal access; HBA	22,128	12,638
Wave 9 – 2019	Four print reports; eight electronic reports; web portal access; HBA	29,798	11,349
Wave 10 – 2020	Four print reports; eight electronic reports; web portal access; HBA	24,999	15,000
Total		**262,584**	**87,361**

[a] HBA stands for high bill alert.

Research Objectives

The evaluation team focused on five research objectives for the 2020 Peer Comparison program:

- Identify any changes made to the program in 2020
- Assess program challenges and successes
- Assess savings by wave, including the newest waves' first year of savings compared to other programs' first year of savings
- Assess any change in savings over time for each wave

Research Approach

The team conducted three research activities to evaluate the 2020 IPL Peer Comparison program research objectives:

- Interviewed IPL and Oracle staff
- Conducted a billing analysis to determine program savings
- Conducted an uplift analysis to determine potential double-counted savings in other residential programs

Program Performance

In 2020, the Peer Comparison program achieved 117% of its energy-savings goal and achieved 99% of its demand reduction goal. The largest wave, Wave 3, experienced a slight increase in savings compared to the 2018 and 2019 program evaluations, up from 0.72% of pre-usage in 2019 to 0.96% in 2020. The new Wave 10 launched in 2020 to help to offset lower savings in some of the recent waves. As shown in Table 136, the program achieved 31,582,567 kWh in net energy savings and 6,927 kW in demand reduction, while spending 58% of the program budget.

Table 136. 2020 Peer Comparison Program Expenditures and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	27,000,000	31,582,567	117%
Demand Reduction (kW)	7,006	6,927	99%
Budget	$1,428,719	$824,244	58%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

The Peer Comparison program achieved an energy-savings realization rate of 97% and a demand reduction realization rate of 88%, as represented by the *ex post* gross savings divided by the *ex ante* gross savings. Table 137 shows the progression of savings adjustments in the impact evaluation.

Table 137. 2020 Peer Comparison Program Savings Summary

Metric	*Ex Ante* Gross	Audited [a]	Verified [a]	*Ex Post* Gross	*Ex Post* Net [b]
Energy Savings (kWh)	32,602,622	32,602,622	32,602,622	31,626,229	31,582,567
Demand Reduction (kW)	7,951	7,951	7,951	6,959	6,927

[a] Audited and verified savings did not apply to the Peer Comparison program, so the team carried the *ex ante* value forward.

[b] Behavior programs that provide home energy reports do not include a NTG savings analysis component because program savings are inherently net. For the impact evaluation and realization rate, net savings reflect the subtraction of any program uplift savings that were already counted in another IPL residential program.

Impact Evaluation

The evaluation team estimated the 2020 program energy savings and demand reduction and quantified the program's impact on participation in IPL's other residential efficiency programs.

Impact Evaluation Methods

Using a panel regression analysis of monthly customer bills, the team estimated program electricity savings by comparing treatment and control homes' electricity consumption. The panel regression controlled for differences in temperature and time effects between the treatment and control groups. We estimated the overall program savings based on the estimated per-home savings value.

The team evaluated demand reduction by applying residential load shapes to the evaluated energy savings and converting the annual energy savings to peak demand reductions. This is a typical way to estimate peak demand reduction in absence of an hourly demand analysis using AMI data, as described in Chapter 10 the UMP.[43] Reported savings were based on per-home kW savings from IPL. Differences in methodologies can lead to diverging realization rates if energy savings fluctuate over time. Using load shapes to identify peak demand reduction based on energy savings is preferrable and more accurate than using fixed per-household demand reduction because it considers the actual achieved energy savings during the evaluation period. A better method to estimate peak demand reductions would be to perform an hourly analysis of treatment and control customers using AMI data, similar to the energy savings analysis.

As a final step, the evaluation team analyzed program participation and measure savings data to determine efficiency program participation uplift as well as program savings counted in other efficiency programs. The team determined *ex post* net savings by subtracting the other program savings values from the *ex post* gross savings.

Impact Evaluation Findings

The following sections outline the impact evaluation findings. Because the evaluation team used a billing analysis, the audited and verified steps do not apply to this program.

Ex Ante and Ex Post Gross Savings

IPL reported a total program savings of 32,603 MWh, as shown in Table 138. Through the billing analysis, the evaluation team estimated program gross savings of 31,626 MWh, with a 90% confidence interval of 24,592 MWh to 38,660 MWh and a relative precision of ±22%. The 90% confidence interval for evaluated savings for each wave shows statistically significant savings. IPL's reported *ex ante* savings were within the confidence interval. The *ex post* gross electricity savings equaled 97% of *ex ante* savings.

Table 138 also shows program gross savings at the wave level, ranging from 649 MWh for Wave 4 to 8,513 MWh for Wave 3. The evaluation team estimated statistically significant savings for most waves. Waves 4, 8, and 10 struggled to achieve savings distinguishable from 0 kWh. Wave 10 is still ramping up,

[43] "Chapter 10: Peak Demand and Time-Differentiated Energy Savings Cross-Cutting Protocol." https://www.nrel.gov/docs/fy17osti/68566.pdf

with only seven months of treatment in 2020, so insignificant savings at this point are not unexpected. Wave 4 has only 6,046 remaining treatment and control group customers and attrition was high for Wave 8, with 37% fewer customers in 2020 compared to 2019. Table 138 also indicates whether each wave is showing an increasing (↑), decreasing (↓), or stable (-) trend in attrition and savings.

Table 138. 2020 Peer Comparison Program Savings by Wave

Wave	Savings (kWh/year)	90% Confidence Interval		Attrition trend	Savings trend
	Ex Post Gross	Lower Bound	Upper Bound		
Wave 1	7,703,032	5,901,560	9,504,504	-	↑
Wave 2	4,614,590	2,514,855	6,714,325	-	-
Wave 3	8,512,651	3,211,225	13,814,078	-	-
Wave 4	649,288	-29,313	1,327,890	↓	↓
Wave 5	1,694,825	115,354	3,274,296	↓	-
Wave 6	1,794,471	288,083	3,300,860	↓	-
Wave 7	3,371,346	1,537,193	5,205,499	↓	-
Wave 8	1,049,207	-316,928	2,415,341	↓	↓
Wave 9	1,140,103	141,118	2,139,089	↓	↑
Wave 10	1,096,716	-408,738	2,602,169	N/A	N/A
Total	**31,626,229**	**24,592,130**	**38,660,329**		

Table 139 and Table 140 show average daily savings with confidence intervals for each wave's lifespan. Typically, a wave's lowest savings are in the first year. As customers receive more reports, savings increase, then savings plateau in the second and third years. The waves in the Peer Comparison program generally follow this pattern. The recently launched Wave 10 achieved savings of 0.35%, which is lower than other waves in their first year of treatment.

Savings for most waves in 2020 are similar to the levels observed in 2019. Wave 4 experienced a dramatic decrease in savings, from 2.68% of pre-usage in 2019 to 1.27% in 2020. Wave 3 experienced a sharp drop in savings during the 2018 program year, as mentioned in the previous evaluation report. The 2020 evaluation revealed that the increase in savings observed in 2019 continued into 2020.

Table 139. 2020 Peer Comparison Program Average Percentage Savings Per Home

Wave	Average Percentage Savings per Home		90% Confidence Interval (2020 Savings)	
	2019	2020	Lower Bound	Upper Bound
Wave 1	2.09%	2.45%	1.88%	3.02%
Wave 2	1.37%	1.50%	0.82%	2.18%
Wave 3	0.72%	0.96%	0.36%	1.56%
Wave 4	2.68%	1.27%	-0.06%	2.60%
Wave 5	1.03%	1.01%	0.07%	1.95%
Wave 6	1.12%	1.06%	0.17%	1.95%
Wave 7	1.05%	0.98%	0.45%	1.51%
Wave 8	0.71%	0.50%	-0.15%	1.16%
Wave 9	0.55%	0.91%	0.11%	1.71%
Wave 10	N/A	0.35%	-0.13%	0.83%

Table 140. 2020 Peer Comparison Program Average Percentage Savings Per Home by Program Year

Wave	Percentage Savings by Program Year								
	First Year	Second Year	Third Year	Fourth Year	Fifth Year	Sixth Year	Seventh Year	Eighth Year	Ninth Year
Wave 1	0.91%	1.80%	1.68%	1.54%	1.86%	2.05%	2.00%	2.08%	2.45%
Wave 2	0.68%	1.12%	1.40%	1.53%	1.52%	1.48%	1.36%	1.50%	N/A
Wave 3	0.87%	1.04%	1.22%	1.09%	0.59%	0.73%	0.96%	N/A	N/A
Wave 4	1.00%	1.09%	1.11%	2.34%	2.63%	1.27%	N/A	N/A	N/A
Wave 5	0.72%	0.89%	0.78%	1.01%	1.01%	N/A	N/A	N/A	N/A
Wave 6	0.64%	0.77%	1.14%	1.06%	N/A	N/A	N/A	N/A	N/A
Wave 7	0.75%	1.10%	0.98%	N/A	N/A	N/A	N/A	N/A	N/A
Wave 8	0.67%	0.50%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wave 9	0.60%	0.91%	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Wave 10	0.35%	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

To check the robustness of model results, the evaluation team tested both difference-in-differences (D-in-D) and post-only models. Table 141 shows post-only average daily savings estimates with 90% confidence intervals and D-in-D average daily savings estimates for each wave. In every case, the D-in-D estimate falls between the upper and lower bounds of the post-only 90% confidence interval, demonstrating that the models' estimates did not statistically differ for any wave. The evaluation team used the post-only model results to calculate *ex post* savings. The table describes differences between the D-in-D and post-only models in greater detail.

Over the last several years, the Peer Comparison program has continued to have realization rates close to 100% and persistent savings from all its waves. However, savings potential appears to decrease with subsequent waves. Table 141 shows that the average daily savings per treatment customer in Wave 1 are approximately 10 times greater than savings in other waves and waves 2 through 7 have savings that are two to three times greater than savings in waves 8, 9, and 10. Additionally, later waves also exhibited higher rates of attrition. The program attrition and lower savings for later waves reflects the

fact that Oracle placed customers with the highest potential for savings in the earlier waves, which means that newer waves overall consist of homes that have lower energy savings potential due to factors such a smaller home size or a more transient customer base.

Table 141. 2020 Peer Comparison Program Difference-in-Differences versus Post-Only Average Daily Savings Estimates

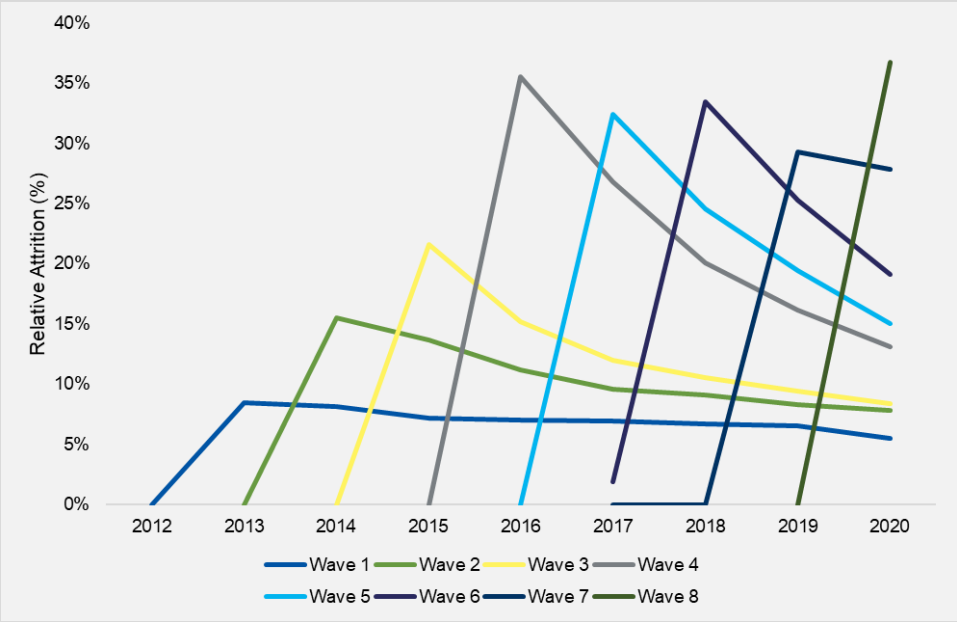
Wave	Customer Segment	Post-Only Model			D-in-D Model
		Average Daily Savings Estimate (kWh)	90% Confidence Interval		Average Daily Savings Estimate (kWh)
			Lower Bound	Upper Bound	
Wave 1	Electricity	1.40	1.08	1.73	1.29
Wave 2	Electricity	0.44	0.24	0.64	0.48
Wave 3	Electricity	0.29	0.11	0.47	0.22
Wave 4	Electricity	0.59	-0.03	1.20	0.38
Wave 5	Electricity	0.45	0.03	0.86	0.33
Wave 6	Electricity	0.39	0.06	0.71	0.41
Wave 7	Electricity	0.34	0.16	0.53	0.33
Wave 8	Electricity	0.15	-0.05	0.35	0.19
Wave 9	Electricity	0.12	0.01	0.23	0.10
Wave 10	Electricity	0.14	-0.05	0.32	0.25

Wave 1 and Wave 2 have had relatively low attrition, as shown in Table 142. The highest attrition for the first two waves was 15.48% for Wave 2 after the first year while Wave 4 through Wave 9 have all had attrition rates of 29% or higher. Figure 49 shows a graphical representation of the relative attrition by wave over time.

Table 142. 2020 Peer Comparison Program Relative Attrition by Wave and Program Year

Wave	Relative Attrition								
	2012	2013	2014	2015	2016	2017	2018	2019	2020
Wave 1	-	8.46%	8.16%	7.20%	7.04%	6.91%	6.69%	6.52%	5.54%
Wave 2		-	15.48%	13.65%	11.15%	9.58%	9.14%	8.34%	7.80%
Wave 3			-	21.57%	15.21%	11.96%	10.53%	9.44%	8.39%
Wave 4				-	35.50%	26.83%	20.06%	16.13%	13.07%
Wave 5					-	32.39%	24.55%	19.43%	15.04%
Wave 6						1.90%	33.42%	25.32%	19.14%
Wave 7						-	-	29.28%	27.87%
Wave 8								-	36.75%
Wave 9									29.09%
Wave 10									

Figure 49. Relative Attrition Over Time by Wave



Waves 4 through 6 all have similar trends in relative attrition, of more than 30% between the first and second year of treatment and between 20% and 25% in the second and third year. Attrition for Wave 7 follows a similar pattern but is slightly lower after the first year, while attrition for Wave 8 is slightly higher after the first year.

Savings for three of the 10 waves (waves 4, 8, and 10) were not statistically significant in 2020 at the desired level of confidence. Higher rates of attrition and lower observed savings (savings less than 1% of average daily usage) increase the risk that the evaluation team will not be able to detect significant treatment effects in future evaluations.

Uplift Analysis

Table 143 shows participation uplift estimates (sometimes referred to as channeling analysis) for each program and the estimated percentage of participation uplift for all Peer Comparison program homes for each wave in 2020. As discussed in the *Ex Ante and Ex Post Gross Savings* section above, uplift reflects the absolute effect on participation, where the percentage of uplift equals the percentage of effect (estimated as the ratio of the participation rate effect to the participation rate of control homes in 2020).

Participation rate uplift remained small in 2020 compared to previous program years, as shown in Table 143. While participation rates as a percentage of control group participation in IPL's other energy efficiency programs appears to vary widely across waves and programs, the small rates of cross-participation in the control groups largely drove this volatility. No programs particularly stood out for experiencing an uplift in participation, though in most cases the Peer Comparison program increased participation in the other programs, as shown by the positive rates.

Table 143. 2020 Peer Comparison Program Participation Uplift for Efficiency Programs

IPL Program	Wave									
	1	2	3	4	5	6	7	8	9	10
Rate Uplift (per 1,000 customers)										
Appliance Recycling	1.3%	-2.1%	-1.0%	-1.0%	1.0%	-2.1%	-0.3%	0.6%	0.4%	0.9%
Lighting and Appliances	0.8%	0.5%	0.2%	1.0%	0.3%	-0.6%	-0.4%	-0.2%	0.1%	0.7%
IQW	-0.2%	-0.8%	-0.7%	-0.3%	-1.0%	-1.2%	-0.2%	-1.2%	-1.5%	0.7%
Whole Home	-7.2%	-0.1%	2.7%	8.2%	-7.0%	-0.7%	1.9%	0.8%	-0.2%	1.4%
Rate Uplift (relative to control group participation)										
Appliance Recycling	0.12%	-0.2%	-0.1%	-0.1%	0.1%	-0.2%	-0.1%	0.2%	0.2%	0.4%
Lighting and Appliances	0.12%	0.1%	0.0%	0.2%	0.0%	-0.1%	-0.1%	0.0%	0.0%	0.2%
IQW	-0.02%	-0.1%	0.0%	0.0%	-0.1%	-0.1%	0.0%	-0.1%	-0.1%	0.1%
Whole Home	-0.15%	0.0%	0.1%	0.3%	-0.2%	0.0%	0.1%	0.0%	0.0%	0.1%

Table 144 shows the amount of electricity savings produced by uplift for Appliance Recycling, IQW, Lighting and Appliances, and Whole Home participants during 2020. The uplift savings reflect the effects of the Peer Comparison program on the savings that customers achieved from participating in IPL's other rebate programs. The evaluation team removed the positive program uplift savings for waves 4, 5, and 10 listed in Table 144 from the 2020 Peer Comparison program to avoid double-counting them in the residential portfolio. The team did not deduct the negative uplift savings evaluated for waves 1-3 or waves 6-9, which could not have been included in the other rebate programs. Negative uplift savings occur when control group customers participate in other programs at higher rates than treatment customers. This is common as programs continue for years. Initially, treatment messaging encourages customers to participate in other efficiency programs. Over time, control customers start participating at higher rates relative to treatment customers who have already participated in the other efficiency programs.

Consistent with the participation uplift results, no program stands out as experiencing large savings uplift across all the waves, though the Appliance Recycling and Whole Home programs tended to experience slightly higher uplift savings per cross-participating customer than that observed for the remaining programs.

Table 144. 2020 Peer Comparison Program Electricity Savings from Program Uplift

IPL Program	Wave									
	1	2	3	4	5	6	7	8	9	10
Savings Uplift per Home (kWh/home)										
Appliance Recycling	0.27	-0.13	-0.26	0.12	1.32	-0.21	-0.18	0.20	-0.02	0.20
IQW	-0.67	-0.44	-0.44	-0.21	0.99	-0.03	-0.22	-0.05	-0.27	0.16
Lighting and Appliances	0.24	0.09	0.04	0.13	0.08	0.01	-0.04	0.06	0.13	0.09
Whole Home	-1.03	-0.76	0.11	1.93	-0.63	-0.06	0.40	-0.48	-0.23	0.28
All Programs	**-1.18**	**-1.25**	**-0.54**	**1.97**	**1.76**	**-0.29**	**-0.05**	**-0.27**	**-0.39**	**0.73**
Savings Uplift Total (kWh/year)										
Appliance Recycling	4,175	-3,859	-21,035	370	14,639	-2,883	-5,530	4,350	-653	4,775
IQW	-10,288	-13,230	-36,055	-664	10,907	-370	-6,653	-1,045	-7,947	3,935
Lighting and Appliances	3,742	2,551	3,447	410	837	179	-1,220	1,244	3,927	2,270
Whole Home	-15,821	-22,710	9,334	6,194	-6,930	-851	12,035	-10,594	-6,823	6,918
All Programs	**-18,192**	**-37,248**	**-44,309**	**6,310**	**19,453**	**-3,926**	**-1,367**	**-6,045**	**-11,497**	**17,899**

Table 145 summarizes the per-wave Peer Comparison program electricity savings that were counted in IPL's other efficiency programs and shows how those savings compare to each wave's *ex post* gross savings estimate. Negative uplift savings are excluded. The total savings from uplift equaled 43.7 MWh per year, which comprised 0.1% of the Peer Comparison program savings.

Table 145. 2020 Peer Comparison Program Double-Counted Electricity Savings

Wave	Savings (MWh/year)	Percentage Savings [a]
Wave 1	0.0	0.0%
Wave 2	0.0	0.0%
Wave 3	0.0	0.0%
Wave 4	6.3	1.0%
Wave 5	19.5	1.1%
Wave 6	0.0	0.0%
Wave 7	0.0	0.0%
Wave 8	0.0	0.0%
Wave 9	0.0	0.0%
Wave 10	17.9	1.6%
Total	**43.7**	**0.1%**

[a] The percentage of savings equals the ratio of Peer Comparison program savings counted in other efficiency programs to total Peer Comparison program savings.

Table 146 shows total kilowatt-hour savings by wave and provides the uplift adjustment.

Table 146. 2020 Peer Comparison Program *Ex Post* Gross and Net Savings with Uplift Adjustment

Wave	*Ex Post* Gross Program Savings (kWh)	Uplift	*Ex Post* Net Program Savings (kWh)
Wave 1	7,703,032	0	7,703,032
Wave 2	4,614,590	0	4,614,590
Wave 3	8,512,651	0	8,512,651
Wave 4	649,288	6,310	642,978
Wave 5	1,694,825	19,453	1,675,372
Wave 6	1,794,471	0	1,794,471
Wave 7	3,371,346	0	3,371,346
Wave 8	1,049,207	0	1,049,207
Wave 9	1,140,103	0	1,140,103
Wave 10	1,096,716	17,899	1,078,817
Total	**31,626,229**	**43,662**	**31,582,567**

Demand Reduction Estimates

Table 147 shows the 2020 Peer Comparison program peak-coincident demand reduction by wave, with 90% confidence intervals. Consistent with the energy-savings results, three waves, Wave 4, Wave 8, and Wave 10, did not achieve statistically significant savings and the confidence intervals around the per-home demand estimates for this wave included zero.

Table 147. 2020 Peer Comparison Program Evaluated Demand Reduction per Home

Wave	Per Home Demand Reduction (kW)	90% Confidence Interval	
		Lower Bound	Upper Bound
Wave 1	0.107	0.082	0.132
Wave 2	0.033	0.018	0.048
Wave 3	0.022	0.008	0.036
Wave 4	0.045	-0.002	0.092
Wave 5	0.034	0.002	0.066
Wave 6	0.030	0.005	0.054
Wave 7	0.026	0.012	0.040
Wave 8	0.011	-0.003	0.026
Wave 9	0.009	0.001	0.017
Wave 10	0.010	-0.004	0.025

Table 148 presents the total peak coincident demand reduction by wave and overall. The evaluation team calculated estimates for each customer segment by multiplying the segment's per-home demand reduction by the number of homes in the treatment group with active accounts at the start of July 2020. The total program peak coincident demand reduction equaled 6,959 kW, with a 90% confidence interval of 5,413 kW to 8,505 kW.

Table 148. 2020 Peer Comparison Program Evaluated Demand Reduction Overall

Wave	Total Demand Reduction (kW)	90% Confidence Interval	
		Lower Bound	Upper Bound
Wave 1	1,644	1,260	2,029
Wave 2	994	541	1,446
Wave 3	1,834	692	2,977
Wave 4	144	-6	294
Wave 5	376	26	726
Wave 6	403	65	741
Wave 7	778	355	1,202
Wave 8	254	-77	585
Wave 9	273	34	512
Wave 10	259	-96	614
Total	**6,959**	**5,413**	**8,505**

Table 149 shows overall demand uplift savings by wave. Half of the waves generated positive uplift demand and, overall, the program generated 30.4 kW in uplift demand reduction in 2020. Like energy savings, this demand reduction should be subtracted from the 2020 Peer Comparison program to avoid double-counting savings in the residential portfolio.

Table 149. 2020 Peer Comparison Program Double-Counted Demand Reduction

Wave	Demand Reduction (kW)	Percentage Savings
Wave 1	0.0	0.0%
Wave 2	0.0	0.0%
Wave 3	13.2	0.7%
Wave 4	13.5	9.4%
Wave 5	0.0	0.0%
Wave 6	0.0	0.0%
Wave 7	0.3	0.0%
Wave 8	3.4	1.3%
Wave 9	0.0	0.0%
Wave 10	1.9	0.7%
Total	**30.4**	**0.4%**

Ex Post Net Energy Savings

By design, home energy report behavior programs, like IPL's Peer Comparison program, inherently produce net savings. Because the program does not offer incentives to customers, and because customers are randomly selected for participation, there is no freeridership associated with the program. Therefore, NTG for the Peer Comparison program is 100%. For reporting purposes, the evaluation team provided *ex post* net savings adjusted for uplift, shown in Table 150.

Table 150. 2020 Peer Comparison Program Net Savings (Adjusted for Uplift)

Wave	Energy Savings (kWh)	Demand Reduction (kW)
Wave 1	7,703,032	1,644
Wave 2	4,614,590	994
Wave 3	8,512,651	1,821
Wave 4	642,978	130
Wave 5	1,675,372	376
Wave 6	1,794,471	403
Wave 7	3,371,346	778
Wave 8	1,049,207	251
Wave 9	1,140,103	273
Wave 10	1,078,817	257
Total	**31,582,567**	**6,927**

Process Evaluation

Due to minimal program changes in 2020, the team focused the process evaluation on gathering feedback from the Peer Comparison program manager at IPL and from Oracle staff regarding design changes, program achievements and challenges, and anticipated program modifications.

Program Delivery and Design

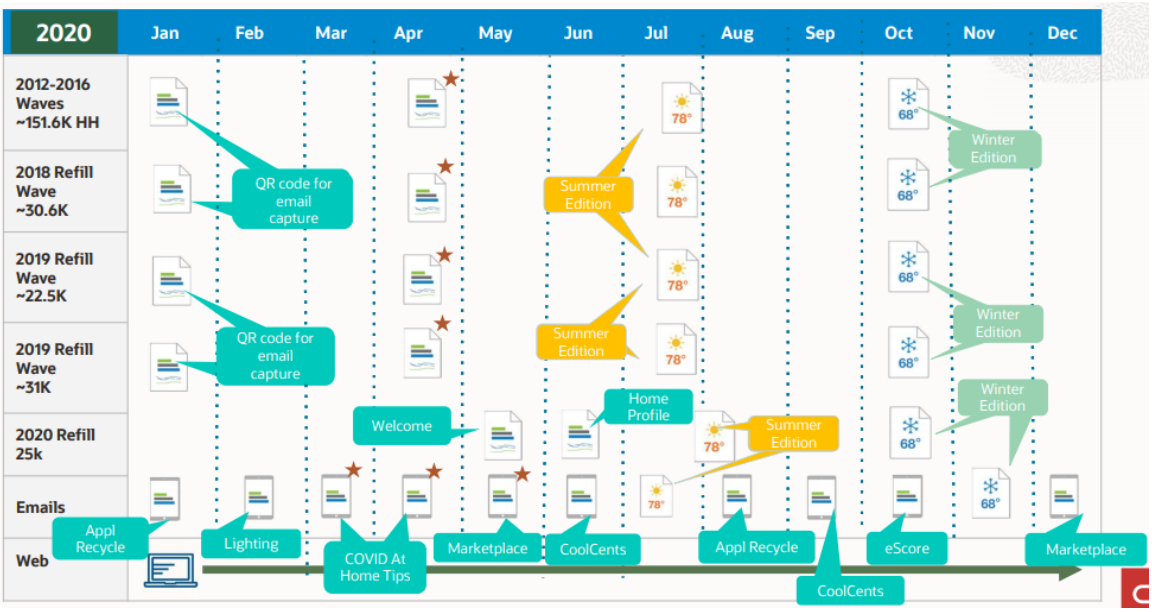
In 2020, the Peer Comparison program entered its ninth year of operation. IPL and Oracle said the program ran smoothly in 2020 due to adding a new treatment group (Wave 10) in May 2020 and Oracle's adaptations to manage the effects of the COVID-19 pandemic. As in 2019, Oracle continued to deliver home energy reports to all treatment group customers and provided all treatment group customers with access to an online portal. Oracle also piloted a Weekly Energy Update email report with a subset of treatment customers in 2020. Another company, Salesforce, began to provide HBAs to all treatment customers with AMI meters in late 2019, yet IPL does not claim savings for HBAs as part of this program. Details about the home energy reports and online portal are provided in the subsections below.

In evaluations of home energy report programs administered by other utilities, the evaluation team has observed a connection between customer satisfaction and the level of treatment, though the program design can influence the impact on customer satisfaction. Additionally, the evaluation team noted that customer satisfaction could decline if the energy usage information contained in HBAs do not align with customers' billed usage. Neither Oracle nor IPL have assessed how IPL customer satisfaction has changed with the addition of HBAs, Weekly Energy Update email reports, or the Home Energy Inspector Audit.

Report Content and Distribution

As in 2018 and 2019, treatment group customers in 2020 in waves 1 through 9 received four paper reports on a quarterly basis (January, April, July, and October). To maximize savings from its new treatment group, Oracle also sent four paper reports to Wave 10 (in May, June, August, and October) and customers with valid emails on file also received monthly email reports, regardless of wave. Figure 50 shows the program's energy savings and participation from 2018 to 2020.

Figure 50. Peer Comparison Program Design and Marketing Module



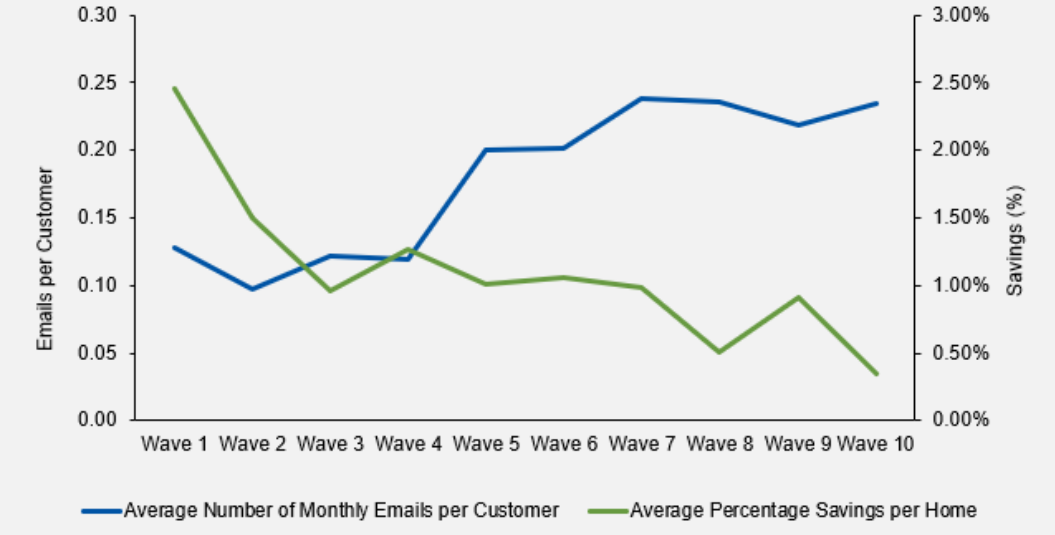
Note: The red stars in the figure indicate the months in which Oracle omitted the Neighbor Comparison module from the home energy reports as part of a COVID-19 response (from late March through May 2020).

As in 2018 and 2019, Oracle changed the email report content monthly and changed the paper report content quarterly by switching the energy-savings tips and the cross-promotion of IPL programs. IPL used the report modules to cross-promote lighting incentives in general and four IPL programs: Appliance Recycling, Demand Response, eScore Home Energy Assessment (which encompasses Whole Home and IQW), and the IPL Marketplace. Oracle also incorporated seasonal tips in the reports to maintain fresh content and keep customers engaged, providing warm weather tips in July paper and online reports and cold weather tips in October paper and November email reports.

Email Open Rates and Click-Through Rates

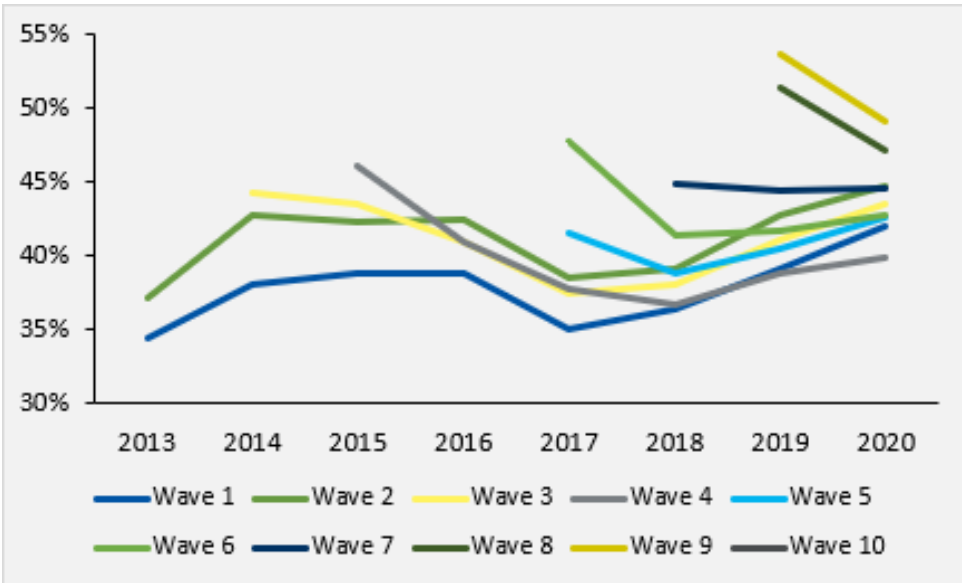
Analysis of the program data shows that though a higher proportion of treatment customers in later waves receive email reports than those in earlier waves, savings per home is still lower for those later waves (Figure 50). This is despite later waves showing higher customer engagement with the emailed reports, as measured by open rates shown in Figure 51.

Figure 51. Average Number of Emails Per Customer by Waves and Average Savings Per Home by Wave



Oracle reported a home energy report email open rate of 45% in 2020, compared to 43% in 2019 and 40% in 2018. Email open rates varied by wave. Though email rates for waves 1-5 have ticked up since 2018, the newest waves had the highest email open-rates in 2020 (Figure 52).

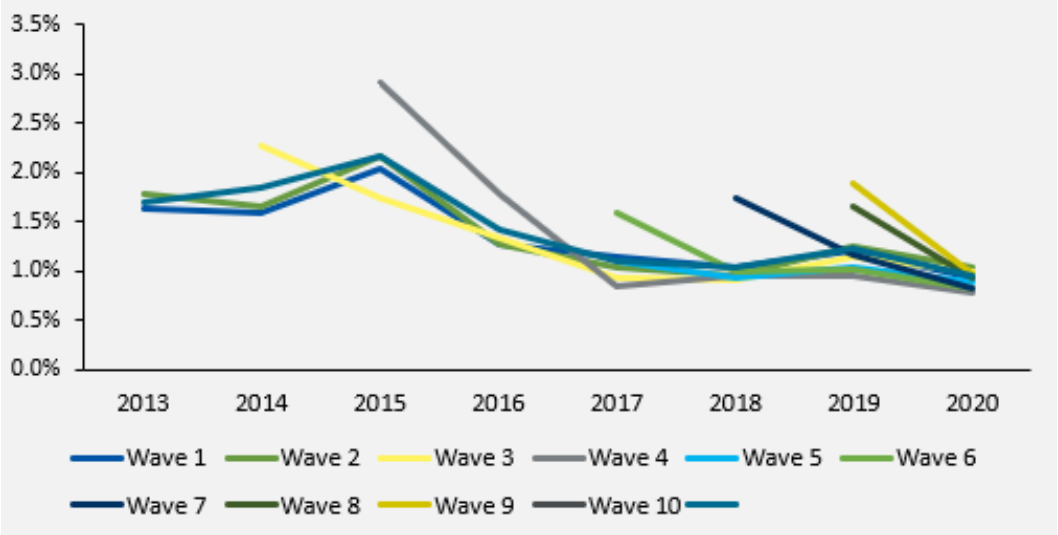
Figure 52. Home Energy Report Email Annual Open Rates 2013 - 2020



Source: Oracle program data.

Click-through rates to linked resources included in the email reports are much lower than email open rates, with just 0.9% of customers opening links in 2020 (1.2% in 2019 and 1.0% in 2018). Click-through rates are highest for newer waves, and click-through rates have declined over time for all waves (Figure 53).

Figure 53. Home Energy Report Email Annual Click-Through Rates 2013 - 2020



Source: Oracle program data.

IPL updates its customer list as it obtains new email addresses from customers and provides them to Oracle so that all customers with an email on file can receive emailed home energy reports. Oracle conducted a QR code campaign via the January paper reports to capture additional customer emails by encouraging recipients to access a webpage via the QR code where they could provide their email address and complete their Home Energy Inspector Audit. Oracle staff hoped that expanding the email list would boost program savings since customers who receive emailed reports experience a higher program treatment level than customers who only receive quarterly paper reports. However, the evaluation team could not discern an impact from the QR code campaign on the number of portal logins or the number of emailed home energy reports in 2020 and the IPL program manager also could not discern a measurable impact from the QR code campaign.

Online Portal and Home Energy Inspector Audit

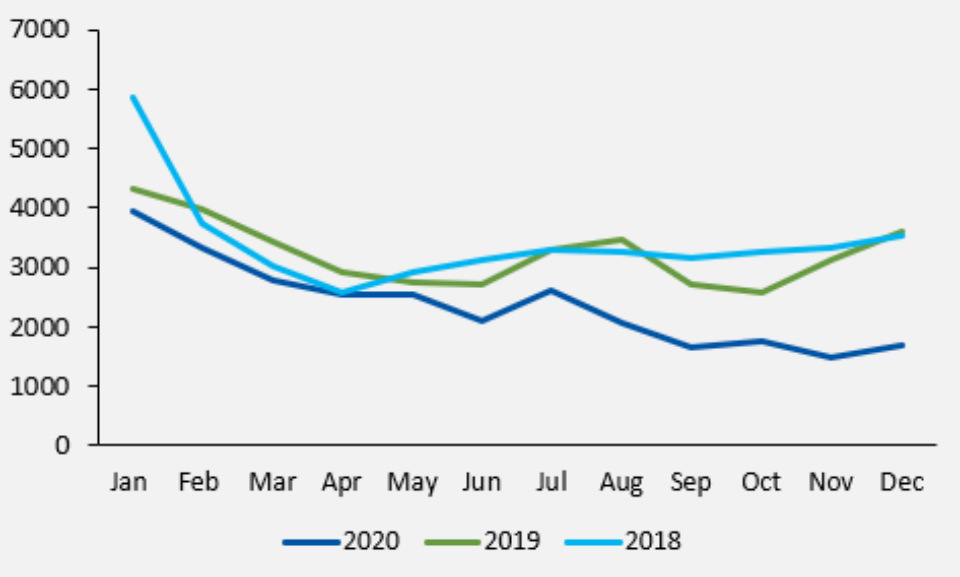
Oracle continued to drive customers to its online portal, obtaining 15,890 new visitors to the portal in 2020 (up from 13,832 new visitors in 2019). The online portal shows all IPL customers their electricity usage over time and energy-savings tips; however, only Peer Comparison program treatment group customers can see anything specific to home energy reports, such as a comparison to their neighbors' energy use.

The online portal also features the Home Energy Inspector Audit, which all IPL customers can use to report their home characteristics to Oracle (such as home age, HVAC type, and the presence of a swimming pool). This audit is separate from the online Home Review or the eScore Home Energy Assessment. Oracle uses customer responses to the Home Energy Inspector Audit to send tailored tips to these treatment customers in future home energy reports. Oracle reported seeing increased engagement from customers who complete the online audit.

The number of unique customer logins to the online portal by treatment group customers is highest in the winter months, and logins typically increase slightly in summer months (Figure 54). Winter and

summer months tend to correspond with the time periods of high customer energy use. Fewer customers logged into the portal per month in 2020 compared to 2019 and 2018.

Figure 54. 2018-2020 Number of Online Portal Logins by Unique Treatment Group Customers

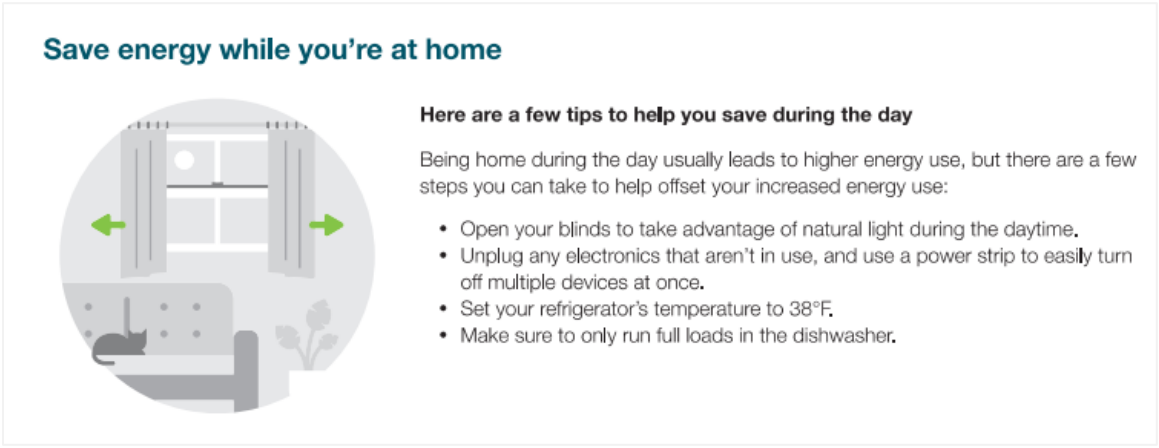


Source: Oracle program data.

Changes from 2019 Design

In response to the COVID-19 pandemic, Oracle replaced the neighborhood comparison module in the March and April reports with tips geared toward saving energy while working from home (Figure 55); Oracle added the neighborhood comparison module back to the reports after April. Oracle's analysis of the program data did not indicate that removing the neighborhood comparison for those two months impacted program savings.

Figure 55. Stay-at-Home Energy-Savings Tips



Source: Excerpt from the April 2020 home energy report.

Oracle also piloted a Weekly Energy Update report with 15,000 treatment and 7,000 control customers who have AMI meters. This weekly email told customers how their energy usage compared to last week's usage and provided tips for how to save energy. These Weekly Energy Update report emails had a 33% open rate in 2020, compared to the 45% open rate for the 2020 home energy report emails. Oracle reported that as a result of the pilot, the treatment group had statistically significant savings over the control group from June to September, ranging from 0.95% to 1.16% savings per month (significant at the 95% confidence level). These savings are in addition to the standard savings from home energy reports. The IPL program manager expressed interest in including a Weekly Energy Update component in future program years.

Future Program Changes

Starting in January 2021, IPL switched implementation vendors from Oracle to Uplight. Uplight retained the same program waves of treatment and control group customers but will switch the online portal from Oracle's platform to Uplight's platform. At the time of the evaluation interview in fall 2020, Uplight and IPL did not plan to offer treatment customers Weekly Energy Update reports.

Follow-Up on 2019 Evaluation Recommendations

The team discussed program status with IPL and Oracle to follow up on recommendations we had made during the 2019 evaluation, shown in Table 151.

Table 151. Peer Comparison Program 2019 Recommendation Status

2019 Recommendation	Status
Consider conducting an analysis of whether the usage data provided in the HBAs and Weekly Energy Update reports align with customer bills. Data that conflict with customer bills could decrease customer program satisfaction.	***Completed.*** IPL aligns the usage data.
Survey treatment customers about their program satisfaction and experience and compare results between customers who do and do not receive Weekly Energy Update, HBAs, and emailed reports. Identify aspects of the HBAs Weekly Energy Update, and Home Energy Inspector Audit that customers find most appealing, least appealing, or confusing.	***Not completed*** due to the change in program vendor for the 2021 – 2023 program years.
Ensure that the new vendor for HBAs continues to only target Peer Comparison treatment group customers and goes through a randomization process to determine which treatment group customers receive reports.	***Completed.*** Salesforce is continuing this practice.
Provide additional treatment to Wave 3 customers in the form of additional paper reports that include a call to action to provide their email addresses to IPL.	***Not completed.*** Oracle did not provide additional treatment to any wave or vary treatment strategies by wave.

Conclusions and Recommendations

CONCLUSION 1: Savings potential appears to decrease for later waves due to high attrition and relatively low savings (as a percentage of pre-usage), both of which will likely result in even fewer waves having significant treatment effects in future evaluations.

Although the program realization rate remains high, at 97%, the evaluation team was unable to detect statistically significant treatment effects for three waves. Average daily savings per treatment customer in Wave 1 are approximately 10 times greater than savings in other waves and savings in waves 2 through 7 are two to three times greater than savings in waves 8, 9, and 10. Savings as a percentage of average daily usage were less than 1% for Wave 3 and waves 7 through 10. This suggests lower savings potential among customers in later waves as behavior-based programs typically achieve savings of 1.5-2% of pre-usage. Additionally, later waves also exhibited higher rates of attrition. Though Wave 1 and Wave 2 have had relatively low attrition (the highest attrition for the first two waves was 15.48%), waves 4 through 9 have all had attrition rates of 29% or more. Wave 8 and Wave 4 both had high levels of attrition, particularly Wave 4, which only had 3,206 treatment customers in 2020.

RECOMMENDATION

Consider redesigning the treatment waves to increase the sample sizes in some of the recent waves with high attrition. Wave 4 has too few customers to reliably measure savings with sufficient statistical precision and should be retired.

Waves 8-10 have sufficient sample sizes but a small treatment effect that does not appear to improve with more email reports. Increasing engagement with more targeted recommendations with these customers could increase savings. Additionally, relative attrition has been higher among later waves. If attrition is driven more by customers opting out of treatment rather than inactive accounts, consider changing messaging to increase customer retention. If savings do not improve and attrition continues at a high rate, consider retiring these waves.

CONCLUSION 2: Though customer engagement with the email reports remained strong in 2020, differences in customer demographics or home type between waves may be driving the lower savings potential and higher attrition for newer waves than the older waves.

Oracle reported an email open rate of 45% across all waves in 2020 for the monthly home energy report (compared to 43% in 2019 and 40% in 2018). However, even though a higher proportion of customers in newer waves receive email reports and have higher email open-rates than older waves, the newer waves also saved less energy per home than older waves in 2020. Oracle placed customers with the highest potential for savings in the earlier waves, which means that newer waves overall consist of homes that have lower energy savings potential due to factors such a smaller home size or a more transient customer base.

RECOMMENDATION

Survey 2021 treatment customers to assess the following:

- Their satisfaction and experience with reports and the online portal. Compare results between wave and customers who do and do not receive email reports.
- Customer demographics and home characteristics. Compare results between wave and those who do and do not receive email reports. If results differ between waves (such as later waves include more renters), tailor report tips for each wave to that wave's demographics.

CONCLUSION 3: The Weekly Energy Update reports have the potential to increase program savings or offset the impacts of program attrition. Changes in email messaging or the introduction of small incentives could increase email click-through rates to linked resources.

Oracle experimented with ways to increase program savings by piloting a Weekly Energy Update report with a subset of treatment customers, which had a 33% open rate in 2020. Oracle reported that as a result of the pilot, the treatment group had statistically significant savings over the control group from June to September, ranging from 0.95% to 1.16% savings per month (significant at the 95% confidence level). These savings are in addition to the standard savings from home energy reports.

IPL switched implementation vendors to Uplight for 2021 to 2023. Uplight will use its own reporting template and online platform, which provides an opportunity to introduce new messaging or promotional strategies to the reports. Although the program had a 45% email open-rate in 2020, just 0.9% of those customers opened the links to resources included in the email (such as the online portal).

RECOMMENDATIONS

Consider adding a Weekly Energy Updates component to the program to offset lower savings potential and higher attrition for newer waves.

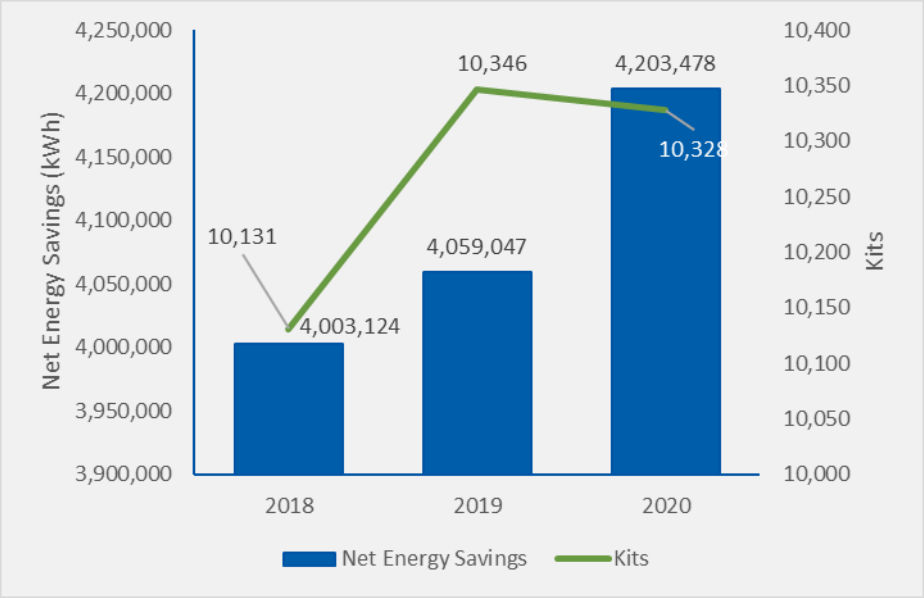
Consider giving points, which can go toward monetary gift cards or an IPL Marketplace purchase, for the following customer actions that increase customer engagement with the program or other IPL programs:

- Logging into Uplight's online portal
- Completing Uplight's online audit
- Making an IPL Marketplace purchase
- Lowering their energy use by a certain amount or percentage over one year

School Kits Program

Through the School Kits program, IPL helps fifth-grade students and their families understand and identify opportunities to manage their energy consumption and provides free energy efficiency kits (2020 Take Action Kit) at participating schools. The 2020 program achieved 96% of its energy-savings goal and 50% of its demand reduction goal, distributing 10,328 kits to families. Despite the COVID-19 pandemic, which forced many schools and thus the program to adapt to an online learning model beginning in March 2020, kit distribution and savings were similar to the past two program years; each year the program has distributed just over 10,000 kits associated with net savings of roughly 4 million kWh (Figure 56).

Figure 56. School Kit Program Savings and Participation 2018-2020



Sources: Indianapolis Power & Light Company. Year-End DSM Scorecards for 2018, 2019, and 2020; Cadmus. Demand-Side Management Evaluation Report for 2018, 2019

Program Description

NEF managed the overall program in 2020, handling program outreach, teacher enrollment, and program curriculum and materials development. AM Conservation Group, a subcontractor to NEF, assembled and shipped the kits to schools.

NEF and AM Conservation Group distributed the school kits and curriculum materials to individually enrolled teachers, who then distributed the kits to their students. Students reported which energy-efficient measures they installed in their homes by completing a program home energy worksheet (HEW). The 2020 Take Action Kit included several measures and materials:

- Three 9-watt general purpose (A19) LED bulbs
- Two 11-watt reflector (BR30) LED bulbs
- One 0.5-watt LED night-light

- One low-flow showerhead (1.5 gpm)
- One kitchen faucet aerator (1.5 gpm)
- One bathroom faucet aerator (1.0 gpm)
- One three-foot segment of water heater pipe wrap insulation
- One furnace filter whistle
- One shower timer
- One water-flow test bag
- One digital thermometer

In 2020, NEF replaced the two 15-watt general purpose (A19) LEDs that were offered in each kit in 2019 with two 11-watt reflector (BR30) LEDs. IPL applied a 40% per-bulb savings reduction in 2020 to A19 bulbs in anticipation of the EISA 2020 backstop going into effect, and began including reflector bulbs to offset the expected energy savings loss for the kit. NEF also added pipe wrap, a water heater setback card, and a shower timer to the kits. IPL did not claim savings for shower timers in 2020. In response to COVID-19–related school closures in March 2020, NEF paused kit shipments and refocused the program to be delivered in a remote learning setting in the fall. This included extending the program to sixth-grade classrooms that had missed participating in the spring as fifth graders.

Research Objectives

The evaluation team conducted qualitative and quantitative research activities to calculate program energy savings and demand reduction and to identify opportunities for program improvement. The evaluation team explored three research objectives:

- Assess program energy savings and demand reduction
- Identify 2020 program challenges and successes and opportunities for improvement
- Explore planned program changes for 2021

Research Approach

To address the research objectives, the evaluation team conducted several activities:

- Interviewed IPL and NEF program staff
- Reviewed program tracking database and NEF shipment data to determine the audited kit quantity
- Applied 2018 installation rates to 2020 kit measures, where applicable
- Calculated *ex post* gross per-measure savings using algorithms and variable assumptions from the Indiana TRM (v2.2) and other sources
- Applied the 2018 kit-level NTG values to develop *ex post* net savings from *ex post* gross results

Program Performance

As shown in Table 152 and Table 153, the 2020 program achieved 4,203,478 kWh in net energy savings and 373 kW in net demand reduction, exceeding its net energy-savings goal and the 2019 savings achievements. The program staff distributed 28 more kits than planned while spending 93% of the budget.

Table 152. 2020 School Kits Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	4,357,808	4,203,478	96%
Demand Reduction (kW)	748	373	50%
Participation (Kits)	10,300	10,328	100%
Budget	$618,597	$573,370	93%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

Table 153. 2020 School Kits Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	4,369,653	4,369,653	4,610,402	4,604,685	4,203,478
Demand Reduction (kW)	749	749	746	417	373

Table 154 shows adjustment factors that the evaluation team applied to *ex ante* gross savings and program realization rates. All kit measures recorded energy-savings realization rates higher than 100% except the pipe wrap (54%) and furnace whistle (36%), and all kit measures recorded demand reduction realization rates higher than 100% except the 9-watt general purpose LEDs (68%), pipe wrap (53%), furnace whistle (51%), and showerhead (15%).

Changes in realization rates were driven primarily by updates the evaluation team made to calculation assumptions (primarily the ISR, as well as household size and electric water heater saturation) based on the results of the 2018 parent survey, which the evaluation team carried forward into the 2019 and 2020 program years as planned. Using 2018 parent survey results, the evaluation team also calculated and applied a mixed baseline wattage that more accurately reflects the types of lighting being replaced by the kit's 9-watt general purpose (A19) LEDs. For newly introduced measures with no prior survey data, the evaluation team used algorithms from the Indiana TRM (v2.2) and Illinois TRM (v8), consistent with those used by IPL to determine *ex ante* savings, but with updated key inputs to more accurately reflect measure savings.

NTG research conducted in 2018 was applied to the 2020 program year. The NTG of 91% for energy savings varies slightly from the NTG of 89% for demand reduction because the team calculated NTG as a weighted value of measure-level impacts; while LEDs have an energy savings impact, they do not have a demand reduction impact.

Table 154. 2020 School Kits Program Realization Rates and Net-to-Gross Summary

Realization Rates		Freeridership [a]		Spillover		NTG	
Energy Savings (kWh)	Demand Reduction (kW)	kWh	kW	kWh	kW	kWh	kW
106%	56%	16%	18%	7%	7%	91%	89%

[a] The evaluation team determined the program-wide freeridership and NTG estimates as the weighted average (by *ex post* gross) of each respective measure-level rate.

Impact Evaluation

The evaluation team calculated audited, verified gross, *ex post* gross, and *ex post* net energy savings and demand reduction for each measure and for the program overall. The savings are detailed in the following sections.

Audited Savings

First, the evaluation team reviewed the number of distributed program kits by comparing reported kit quantities from IPL's December 2020 scorecard with year-end shipment data from NEF. The two sources matched, with both showing 10,328 kits distributed. This resulted in equal *ex ante* and audited savings for the program (Table 155).

Table 155. 2020 School Kits Program Audited Savings Results

Kit Measure	Energy Savings (kWh)		Demand Reduction (kW)	
	Ex Ante	Audited	*Ex Ante*	Audited
9-watt A19 LED (3)	356,688	356,688	149	149
11-watt BR30 LED (2)	604,271	604,271	62	62
LED night-light	34,764	34,764	0	0
Showerhead	1,296,309	1,296,309	275	275
Kitchen faucet aerator	1,050,368	1,050,368	27	27
Bathroom faucet aerator	126,280	126,280	8	8
Pipe wrap	233,093	233,093	27	27
Water heater setback	65,541	65,541	7	7
Furnace whistle	602,339	602,339	194	194
Total	**4,369,653**	**4,369,653**	**749**	**749**

Note: Values rounded for reporting purposes.

Verified Savings

To calculate verified savings, the evaluation team adjusted audited savings by replacing the *ex ante* ISR with the verified ISR, derived from a 2018 follow-up online survey conducted with 72 parents and guardians of students who received kits through the program (henceforth referred to as the 2018 parent survey). The 2020 evaluation scope did not include a parent survey due to the consistency in results over past years.

The verified ISR results are shown in Table 156. In evaluating other similar school kit programs, the evaluation team has observed that ISRs from HEWs are significantly lower than ISRs from follow-up (parent) surveys. This likely occurs because follow-up surveys are distributed months after the HEWs, providing parents and guardians with more time to install the measures they received.

Table 156. 2020 School Kits Program Verified In-Service Rates

Measure	Verified ISR
9-watt A19 LED (3)	94%
LED night-light	83%
Showerhead	61%
Kitchen faucet aerator	62%
Bathroom faucet aerator	53%
Furnace whistle	39%

In 2020, NEF replaced the two 15-watt general purpose (A19) LEDs in each kit with two 11-watt reflector (BR30) LEDs and also added pipe wrap and a water heater setback card, among other measures. Because the evaluation team did not administer parent surveys to assess ISRs in 2020, we used ISRs from the Indiana TRM (v2.2) and Illinois TRM (v8) for the three new kit measures. For *ex ante* savings, IPL assumed a direct-install ISR of 100% for reflector LEDs, 30% for pipe wrap, and 16% for water heater setback cards (based on a verified ISR from the Ameren Illinois' 2016 school kits evaluation).[44]

Table 157 shows a comparison of 2020 *ex ante* and verified ISRs. For *ex ante* ISRs for existing measures, IPL used the Cadmus 2017 *Demand-Side Management Portfolio Report*. The evaluation team verified ISRs for these measures through the 2018 parent survey. For pipe wrap and water heater setback cards, the evaluation team set verified ISRs equal to *ex ante* ISRs. The *ex ante* ISRs for these measures resembled verified ISRs from similar evaluations conducted by Cadmus, and therefore the evaluation team considered them to be reasonable.

For the 11-watt reflector LEDs, the evaluation team determined an *ex ante* ISR of 100%, which reflects a direct-install program instead of a typical school kit program (in which not all participants would install all measures, especially specialty LEDs). The evaluation team applied the deemed ISR of 81.5% from the Illinois TRM (v8), which IPL relies on for other School Kits program savings algorithms. The team then applied the lifetime ISR methodology outlined in Chapter 6 of the UMP to account for bulbs in storage being installed in future program years.

[44] Opinion Dynamics. January 18, 2018. "Impact and Process Evaluation of 2016 (PY9) Ameren Illinois Company Residential Energy Efficiency School Kits Program." https://ilsag.s3.amazonaws.com/AIC_PY9_School_Kits_Report_FINAL_2018-01-18.pdf

Table 157. 2020 School Kits Program Comparison of *Ex Ante* and Verified In-Service Rates

Measure	*Ex Ante* ISR	Verified First-Year ISR	Verified Lifetime ISR	Verified ISR Source
9-watt A19 LED (3)	70%	94%	97%	2018 parent survey
11-watt BR30 LED (2)	100%	82%	89%	Illinois TRM (v8)
LED night-light	88%	83%	83%	2018 parent survey
Showerhead	50%	61%	61%	2018 parent survey
Kitchen faucet aerator	50%	62%	62%	2018 parent survey
Bathroom faucet aerator	50%	53%	53%	2018 parent survey
Pipe wrap	30%	30%	30%	IPL *ex ante* assumption
Water heater setback	16%	16%	16%	IPL *ex ante* assumption
Furnace whistle	100%	39%	39%	2018 parent survey

Table 158 shows a comparison of *ex ante* energy savings and demand reduction provided by IPL to verified energy savings and demand reduction calculated by the evaluation team. Verified savings, calculated using lifetime verified ISRs, exceeded *ex ante* savings by approximately 240,749 kWh (106% of *ex ante* savings) because the verified ISRs generally exceeded the *ex ante* ISRs shown in Table 157.

Table 158. 2020 School Kits Program Verified Energy Savings

Kit Measure	*Ex Ante* Savings (kWh)	Verified Savings (kWh)	*Ex Ante* Reduction (kW)	Verified Reduction (kW)
9-watt A19 LED (3)	356,688	492,634	149	205
11-watt BR30 LED (2)	604,271	538,383	62	55
LED night-light	34,764	32,634	0	0
Showerhead	1,296,309	1,570,177	275	333
Kitchen faucet aerator	1,050,368	1,309,154	27	33
Bathroom faucet aerator	126,280	133,496	8	9
Pipe wrap	233,093	233,093	27	27
Water heater setback	65,541	65,541	7	7
Furnace whistle	602,339	235,289	194	76
Total	**4,369,653**	**4,610,402**	**749**	**746**

Note: Values rounded for reporting purposes.

Ex Post Gross Savings

The evaluation team calculated *ex post* energy savings and demand reduction for kit measures using the Indiana TRM (v2.2) algorithms and inputs derived from 2018 parent survey results, except for four measures:

- ***General Purpose LEDs:*** For 9-watt general purpose (A19) LEDs, the evaluation team continued to use the mixed-baseline wattage approach instituted for the 2018 program year. In the 2018 parent survey, respondents indicated the types of bulbs they replaced with kit LEDs. The evaluation team applied the equivalent lumen wattage method (per the UMP) to the baseline

technology specified in each response, deriving a unique savings value for each respondent. Then we calculated a weighted average baseline wattage according to the derived values.

- ***Reflector LEDs and Water Heater Setback Card:*** The Indiana TRM (v2.2) does not outline algorithms for calculating energy savings and demand reduction for specialty LEDs or water heater setback cards. In 2020, the evaluation team implemented savings algorithms for both measures as prescribed in the Illinois TRM (v8). The inputs we used in each algorithm are outlined in *Appendix K*.
- ***Furnace Whistle:*** The Indiana TRM (v2.2) does not outline an algorithm for calculating energy savings and demand reduction for furnace whistles. In 2018, 2019, and 2020, the evaluation team implemented a savings algorithm for furnace whistles prescribed in the 2016 Pennsylvania TRM,[45] which the team considered more accurate than the Indiana TRM (v2.2) since it had been updated more recently (and is consistent with the algorithm IPL uses for *ex ante* savings). The inputs we used in this algorithm are outlined in *Appendix K*.

Table 159 shows a comparison of *ex ante* and *ex post* per-unit savings for each measure. *Ex post* savings reflect updated values for ISRs, baseline wattages, WHFs, average household size, average number of bathrooms and showers per home, and water heater fuel type saturation rates.

Table 159. 2020 School Kits Program *Ex Ante* and *Ex Post* Gross Per-Unit Savings

Measure	Energy Savings Per Unit (kWh)		Demand Reduction Per Unit (kW)	
	Ex Ante	*Ex Post*	*Ex Ante*	*Ex Post*
9-watt A19 LED (3)	11.51 per unit (34.54 total)	23.40 per unit (70.20 total)	0.0048 per unit (0.0144 total)	0.0033 per unit (0.0098 total)
11-watt BR30 LED (2)	29.25 per unit (58.51 total)	40.42 per unit (80.83 total)	0.0030 per unit (0.0060 total)	0.0056 per unit (0.0112 total)
LED night-light	3.37	3.78	0.0000	0.0000
Showerhead	125.51	133.89	0.0266	0.0041
Kitchen faucet aerator	101.70	104.06	0.0026	0.0027
Bathroom faucet aerator	12.23	13.18	0.0008	0.0009
Pipe wrap	22.57	12.14	0.0026	0.0014
Water heater setback	6.35	7.01	0.0007	0.0008
Furnace whistle	58.32	20.75	0.0188	0.0095
Total Per Kit	**423.09**	**445.84**	**0.0725**	**0.0404**

For each measure, *ex post* savings differed from *ex ante* savings for various reasons:

- ***General Purpose LEDs:*** *Ex post* savings differed from *ex ante* savings for 9-watt general purpose (A19) LEDs primarily due to differences in ISR, baseline wattage, and WHF assumptions. The evaluation team updated deemed baseline wattage and WHF values with actual baseline values

[45] Pennsylvania Public Utility Commission. June 2016. *Technical Resource Manual: State of Pennsylvania: Act 129 Energy Efficiency and Conservation Program and Act 213 Alternative Energy Portfolio Standards*. https://www.puc.pa.gov/pcdocs/1370278.docx.

from the 2018 parent survey; for kit LEDs that replaced existing LEDs, the evaluation team attributed zero savings.

- ***Reflector LEDs:*** *Ex post* savings differed from *ex ante* savings for 11-watt reflector (BR30) LEDs because of differences in ISR, baseline wattage, AOH, and WHF assumptions. The evaluation team used the EISA-prescribed baseline of 65 watts and applied an AOH assumption consistent with that for general purpose LEDs. The evaluation team also applied an ISR of 81.5%, as deemed by the Illinois TRM (v8), to replace the 100% ISR assumed for *ex ante* savings.
- ***LED Night-Lights:*** *Ex post* savings differed from *ex ante* savings for LED night-lights primarily due to differences in ISRs and lower observed rates of incandescent night-lights being replaced by LED night-lights. The Indiana TRM (v2.2) specifies that LED night-lights must replace incandescent night-lights to achieve savings. Like the approach used for 9-watt and 15-watt LEDs, the evaluation team attributed zero savings for replacing existing LED night-lights and negative savings for night-lights installed in empty outlets (per the 2018 parent survey).
- ***Water-Saving Measures:*** *Ex post* savings differed from *ex ante* savings for showerheads, kitchen faucet aerators, and bathroom faucet aerators primarily due to differences in ISRs, electric water heater saturation rates, and demographic inputs such as household size and number of showerheads and aerators per home. The evaluation team updated these values using 2018 parent survey results.
- ***Pipe Wrap:*** *Ex post* savings differed from *ex ante* savings for pipe wrap due to the evaluation team accounting for electric water heater saturation, per 2018 parent survey results.
- ***Water Heater Setback:*** *Ex post* savings differed from *ex ante* savings for water heater setback cards because the evaluation team used calculations from the Illinois TRM (v8) to determine energy savings and demand reduction. Per documentation provided by IPL, IPL also used the Illinois TRM (v8) to calculate *ex ante* savings; however, the *ex ante* savings from this documentation did not match the reported savings in the program's tracking data.
- ***Furnace Whistle:*** *Ex post* savings differed from *ex ante* savings for furnace whistles because the evaluation team used the 2016 Pennsylvania TRM to determine energy savings and demand reduction. The evaluation team applied a verified ISR of 39% in place of the 100% ISR assumed for *ex ante* savings. The *ex ante* demand reduction algorithm double-counted ISR and did not include a coincidence factor. To correct for this, the evaluation team removed the second ISR value and applied a coincidence factor of 0.647, consistent with the 2016 Pennsylvania TRM.

Realization Rates

The evaluation team estimated overall realization rates of 106% for energy savings and 56% for demand reduction, as shown in Table 160 and Table 161, respectively.

Table 160. 2020 School Kits Program *Ex Ante* and *Ex Post* Gross Electric Energy Savings (kWh)

Measure	*Ex Ante* Savings	Audited Gross Savings	Verified Gross Savings	*Ex Post* Gross Savings
9-watt A19 LED (3)	356,688	356,688	492,634	724,986
11-watt BR30 LED (2)	604,271	604,271	538,383	834,855
LED night-light	34,764	34,764	32,634	39,058
Showerhead	1,296,309	1,296,309	1,570,177	1,382,827
Kitchen faucet aerator	1,050,368	1,050,368	1,309,154	1,074,736
Bathroom faucet aerator	126,280	126,280	133,496	136,161
Pipe wrap	233,093	233,093	233,093	125,335
Water heater setback	65,541	65,541	65,541	72,424
Furnace whistle	602,339	602,339	235,289	214,303
Total Savings	**4,369,653**	**4,369,653**	**4,610,402**	**4,604,685**
Total Program Realization Rate (*Ex Post* Gross / *Ex Ante*)				**106%**

Note: Values rounded for reporting purposes.

Table 161. 2020 School Kits Program *Ex Ante* and *Ex Post* Peak Demand Reduction (kW)

Measure	*Ex Ante* Reduction	Audited Gross Reduction	Verified Gross Reduction	*Ex Post* Gross Reduction
9-watt A19 LED (3)	149	149	205	101
11-watt BR30 LED (2)	62	62	55	116
LED night-light	0	0	0	0
Showerhead	275	275	333	42
Kitchen faucet aerator	27	27	33	28
Bathroom faucet aerator	8	8	9	9
Pipe wrap	27	27	27	14
Water heater setback	7	7	7	8
Furnace whistle	194	194	76	98
Total Savings	**749**	**749**	**746**	**417**
Total Program Realization Rate (*Ex Post* Gross / *Ex Ante*)				**56%**

Note: Values rounded for reporting purposes.

Ex Post Net Savings

Using responses to the 2018 parent survey, the evaluation team estimated freeridership and spillover. *Appendix K* describes the methodology and results in greater detail. General purpose LEDs had the highest freeridership rates, while furnace whistles had the lowest. Because pipe wrap and water heater setback cards were new addition to the kits in 2020, the team assumed NTGs of 100% because they are behavior modifications that are often overlooked by homeowners. Table 162 shows *ex post* gross and net energy savings and demand reduction, both by measure and for the program overall.

Table 162. 2020 School Kits Program *Ex Post* Gross and Net Savings and Reduction

Measure	*Ex Post* Gross Savings		NTG		*Ex Post* Net Savings	
	kWh	kW	kWh	kW	kWh	kW
9-watt A19 LED (3)	724,986	101	82%	82%	594,488	83
11-watt BR30 LED (2)	834,855	116			684,581	95
LED night-light	39,058	0	89%	89%	34,762	0
Showerhead	1,382,827	42	94%	94%	1,299,857	40
Kitchen faucet aerator	1,074,736	28	98%	98%	1,053,242	27
Bathroom faucet aerator	136,161	9	93%	93%	126,629	9
Pipe wrap	125,335	14	100%	100%	125,335	14
Water heater setback	72,424	8	100%	100%	72,424	8
Furnace whistle	214,303	98	99%	99%	212,160	97
Total	**4,604,685**	**417**	**91%**	**89%**	**4,203,478**	**373**

Note: Values rounded for reporting purposes.

Process Evaluation

For the process evaluation, the evaluation team interviewed IPL and NEF program staff about changes to the program design and delivery, successes and challenges during the 2020 program year, and future program plans.

Program Design and Delivery

IPL and NEF reported making program changes in 2020 that included updating the kit contents, making adaptations to teacher recruiting, creating different educational resources, and updating other processes to accommodate the COVID-19 pandemic.

COVID-19 Impacts

In March 2020, public health officials ordered schools to close their physical locations and move to online education due to the spread of COVID-19. In response, NEF paused kit shipments and refocused efforts on the fall portion of the program delivery year. NEF also increased the program flexibility to minimize the burden on teachers and reoriented the kit content to work better in a remote setting. The program was already set up to rely on teachers to deliver the educational content. IPL extended the timeframe so that fifth graders who were not able to participate due to the spring school closures were able to participate in the fall as sixth graders.

Kit Contents

After staying largely the same in 2018 and 2019, IPL changed the Take Action Kit contents in 2020, adding a three-foot section of pipe wrap, replacing the two 15-watt standard LEDs with two 11-watt BR30 specialty LEDs, and adding savings from the setback of water heaters. IPL also began providing the kit in a reusable, branded drawstring backpack instead of a box. Due to the switch to lower wattage LED bulb types, IPL increased the 2020 participation goal by 300 kits to offset the decline in deemed savings per bulb.

NEF improved the furnace whistle quality in 2020 to claim higher *ex post* net measure savings by improving measure installation rates.

Teacher Recruitment and Resources

IPL and NEF changed the teacher recruitment process in 2020 to accommodate adaptations to the COVID-19 pandemic. As in previous years, NEF recruited teachers to participate in the fall or spring semester via mass emails, following up with individual emails and phone calls. When marketing the program, NEF promoted the benefits of free teaching materials that follow state education standards, the chance to promote energy efficiency to students via fun activities, and the opportunity for families to save money in their homes. In the fall of 2020, NEF pre-registered teachers who had participated in prior years and it began marketing the program earlier than it had in prior years in order to identify and plan for turnover and to highlight the flexibility for teachers to implement the program at their convenience. IPL's website allowed teachers to enroll online (as well as by phone). NEF needed to recruit 405 teachers in 2020, compared to 372 in 2019, due to increased participation goals, reduced class sizes, teacher turnover, and the need to recruit new teachers for qualifying sixth-grade classrooms in the fall. Toward the end of the recruitment period, NEF offered an additional bonus mini-grant, tied to the shipment of teacher materials.

Once enrolled, teachers received the curriculum and kits via mail from AM Conservation Group. NEF uploaded teacher contact information and the number of distributed kits into the VisionDSM database. Program data from VisionDSM showed that repeat participation is common, with 38% of the 2018 program teachers having also participating in the 2019 program. In 2020, 36% of teachers had also participated in 2018 or 2019. As a result of recruitment efforts, the program exceeded its 2020 participation goal by 28 kits.

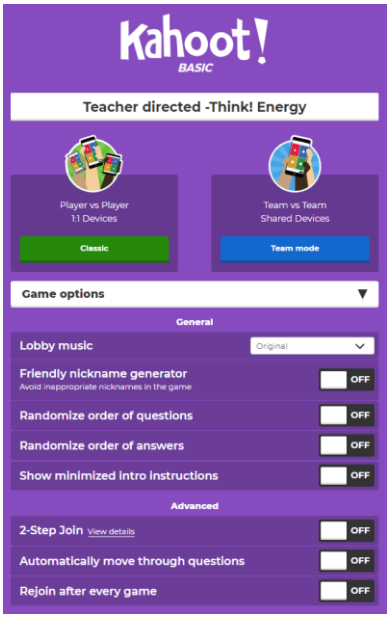
Participating teachers received a hardcopy packet, as in previous years, that included several components:

- A teacher guide and online links where teachers could access further information regarding energy-related activities
- A PowerPoint presentation explaining the program
- Three energy-related posters featuring activities and games (on the back of the poster)

For greater flexibility, NEF also made teacher content available in an electronic format. In 2019, the teacher packet included a DVD, but NEF dropped the DVD format in 2020 and made the content available on its website. NEF designed the lessons so they could be taught all at once or throughout the semester and so they contributed to lesson plans that helped teachers meet state curriculum and Next Generation Science Standards. NEF created two versions of lesson plans (Teacher Guide A and Teacher Guide B) and will alternate this guide every other year so that repeat teacher participants will have access to the new curriculum.

To support a higher level of engagement from remote learners in 2020, NEF added a Kahoot! interactive review activity (Figure 57).

Figure 57. 2020 School Kits Program Kahoot! Review Activity



Source: Indianapolis Power & Light, Ways to Save, and National Energy Foundation. "Teacher-Directed Think Energy Kahoot! Review Game." https://play.kahoot.it/v2/?quizId=da527ce9-7bfb-43dd-a7f0-1452005d7689

Student Resources and Home Energy Worksheets

Teachers distributed energy-saving Take Action Kits to each student and encouraged them to install the measures at home, together with their family. Remote learners could receive kits as part of regular school supply pick-ups. The installation instructions included in the kit and online are in both English and Spanish. The program website also serves as a one-stop-shop for students and their parents, featuring instructional videos, energy efficiency themed games, and a link to the online HEW. NEF also added an interactive platform to the website that allows students to choose an avatar, explore a virtual home to learn about energy-savings opportunities, and play a game about energy efficiency.

In 2020, NEF provided students with direct online access to the presentation, a Family Guide, and activities to enable them to complete activities on their own. NEF redesigned the previous Student Guide, creating a Family Guide in 2020 (shown in Figure 58). To accomplish this, NEF removed content that overlapped with the presentation or installation videos, and supplemental activities already provided to teachers to distill the content so that it was focused on key takeaways and kept up with educational trends. NEF also added color to match the poster branding. As a student incentive, NEF offered a scented highlighter in 2020.

Once a student installed the kit measures, NEF asked them and their families to complete the program HEW, either online or on paper, and return it to their teacher. As in prior years, NEF provided a $50 Amazon e-gift card stipend to teachers who returned at least 80% of their student's HEWs. In 2020, NEF extended the deadline for teachers to provide HEWs, from December to January, in order to collect as much feedback as possible. The HEW return rate dropped in 2020 to 29% (3,005 HEWs returned), after achieving a high of 51.4% in 2019. NEF used the HEW results for its own data analytics, such as examining which schools have the highest percentage of families saying they installed the kit measures.

Figure 58. 2020 School Kits Program Family Guide

Source: Indianapolis Power & Light, Ways to Save, and National Energy Foundation. "Think! Energy Family Guide." https://thinkenergy.org/aes/families/#StudentGuide

Program Successes and Challenges

When asked about successful program elements, IPL and NEF said that they received positive feedback from teachers, particularly about the ease of using the lesson plan, and said that teachers continued to express high interest in participating in the 2021 program. NEF said the new Kahoot! activity was well-received by teachers. In spite of major school disruptions and having to revamp the teacher recruitment and resource materials for remote learning, IPL and NEF achieved the program participation goal.

IPL and NEF were not able to cite elements that were not well-received in 2020.

Planned Program Changes

IPL and NEF anticipate a variety of changes to the program for 2021. Most significantly, they will stop offering general service 9-watt LED bulbs due to a pending change to federal standards. NEF also plans to update the branding, add an e-learning module to the website to support more independent student learning, and update the content to be more engaging in the absence of a live presenter.

Follow-Up on 2019 Evaluation Recommendations

The evaluation team made one recommendation in the 2019 evaluation report, suggesting that IPL consider conducting a new parent survey at the beginning of the next three-year cycle in 2021. The recommendation was not intended to be completed for the 2020 evaluation and remains pending while IPL identifies evaluation priorities for 2021. Table 163 shows the status of this recommendation.

Table 163. School Kits Program 2019 Recommendation Status

2019 Recommendation	Status
Conduct another parent survey in 2021 to assess whether installation rates have changed as a result of NEF's increased educational resources and improved product quality.	**Not completed.** This recommendation is pending, based on 2021 evaluation planning.

Conclusions and Recommendations

CONCLUSION 1: IPL and NEF overcame significant program operation challenges in 2020 to meet the increased program participation goal.

Following school closures, the School Kits program staff needed to align education materials with remote learning, and needed to recruit 33 more teachers in 2020 than in 2019. IPL and NEF quickly adapted and even slightly exceeded the 2020 program participation goal (which was an increase of 300 kits over the 2019 participation goal). They obtained this success through recruiting efforts, flexible participation timing, material updates, and new engaging content (via Kahoot!). NEF received positive feedback from participating teachers about their experience with the 2020 program, and said these teachers reported a very high interest in participating again in 2021. NEF pointed to the Kahoot! activity as one of the more successful elements of the 2020 School Kits program.

CONCLUSION 2: The inclusion of new measures enabled the School Kits program to generate energy savings and demand reduction consistent with previous program years. Claiming savings for piloted measures will increase savings even more.

Reflector (BR30) LEDs, water heater pipe wrap, and water heater setback cards displaced the energy savings lost by removing 15-watt general purpose (A19) LEDs. Additional measures in 2021 will help add energy savings where general purpose LED savings have decreased.

CONCLUSION 3: *Ex ante* savings algorithms for new measures contained discrepancies or unrealistic assumptions that affected realization rates in 2020.

For reflector (BR30) LEDs, IPL assumed a 37.18-watt baseline, consistent with the Indiana TRM (v2.2) for general purpose LEDs. This is satisfactory in the absence of survey data for reflector LEDs; the evaluation team leveraged participant surveys in 2018 to establish mixed baseline wattages that captured the assortment of existing lighting measures replaced by the kit's general purpose LED measures. IPL also incorporated the ISR for furnace whistles twice, instead of using a coincidence factor for the demand reduction algorithm.

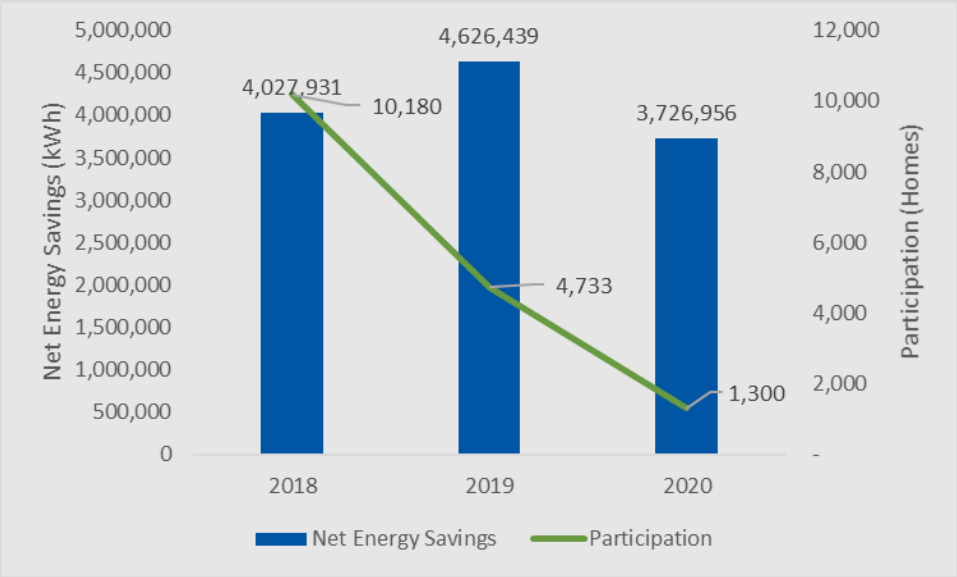
RECOMMENDATION

Update *ex ante* assumptions to more accurately capture measure energy savings and realization rates. Specifically, for reflector LEDs, update the baseline wattage based on the lumens rating (45 lumens per watt) and for furnace whistles, replace the second ISR with a coincidence factor, even if that coincidence factor is 1.0.

Whole Home Program

Through the Whole Home program, IPL offers opportunities for customers to save energy through direct install measures, energy-saving kits, and add-on measures. The program implementer, CLEAResult, is responsible for program marketing and outreach, scheduling and conducting the eScore Home Energy Assessments, distributing kits, and determining customer eligibility for add-on measures.

The program achieved 51% of its energy savings goal in 2020, likely due to the COVID-19 pandemic, which caused the program to halt all in-person activities in March and throughout the remainder of the year. Although IPL successfully pivoted the program to distributing energy-saving measures through kits, virtual audits, and rebates, the in-person energy-saving actions, such as installing direct install measures, have historically been the core contributors to program savings. For example, in 2019, direct install measures accounted for 75% of the *ex post* gross program savings. the program's energy savings and participation from 2018 to 2020.Figure 59 shows the program's energy savings and participation from 2018 to 2020.Figure 59. Whole Home Program Savings and Participation 2018-2020



Program Description

Customers can participate in the program by completing an online Home Review or scheduling a Home Energy Assessment. For the online Home Review, customers enter information about their home and receive recommendations for improvements. Customers are encouraged, but not required, to complete this online Home Review during the online scheduling process for their Home Energy Assessment.[46] IPL also allows customers to complete the online Home Review after a Home Energy Assessment or in absence of a Home Energy Assessment.

[46] Customers can also schedule their Home Energy Assessment by contacting CLEAResult directly.

Upon completing the online Home Review, participants receive an energy-savings kit. New for 2020, customers are able to pick from three different kits: (1) the Home Efficiency Starter kit;[47] (2) the Bathroom Refresher kit; and (3) the Tech-Savvy kit. The contents for each kit are shown in Table 164.

Table 164. 2020 Whole Home Program Kit Options

Option #1 Home Efficiency Starter Kit and In-Person Home Energy Assessment Kit	Option #2 Bathroom Refresher Kit	Option #3 Tech-Savvy Kit
• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • A $10.00 gift certificate to Lowe's	• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • A $10.00 gift certificate to Lowe's • 1 spa-style wide showerhead (1.5 gpm) • 1 kitchen faucet aerator (1.5 gpm)	• 3 LED bulbs • 1 LED night-light • 1 high-pressure bathroom sink aerator (1.0 gpm) • 1 furnace filter whistle • A $10.00 gift certificate to Lowe's • 1 advanced power strip (Tier 1)

From January through March 2020, CLEAResult technicians provided in-person eScore Home Energy Assessments for customers, during which they evaluate home energy use, replace inefficient equipment with direct install measures, and assess the home for add-on measures. Upon completing the in-home assessment, the technician discusses home-tailored recommendations to help the occupants save energy. The technician later emails the customer a link to the assessment report, which contains several types of information:

- A summary of the customer home energy use
- Recommendations for actions and energy efficiency upgrades beyond those directly installed during the Home Energy Assessment
- Information about other IPL programs
- Tips and recommendations intended to drive energy-saving behavioral changes

During the Home Energy Assessment, the technician installs several energy-saving devices:

- LEDs (5-watt candelabra, 5-watt globe, 7-watt track light, 9-watt interior, 9-watt exterior, 16-watt, and R30 depending on existing lighting composition)
- Water-saving devices (bathroom aerators, kitchen aerators, and low-flow showerheads)
- Pipe wrap
- Programmable thermostats
- Smart thermostats
- Water heater setback

[47] This kit contains similar contents to the program kit provided in prior years.

Once the COVID-19 pandemic hit, IPL ceased in-person program activities for the remainder of the year, and instead began offering virtual assessments in June 2020. Participants now schedule their assessment through the online portal, similar to how scheduling was for their Home Energy Assessment experience. After the customer completes a virtual home assessment, they are eligible for a custom kit from the CLEAResult technician who conducted the virtual assessment.

IPL also offers rebates for larger home improvements as a second participation phase. Technicians recommend these improvements, including HVAC retrofits and infiltration measures, during the Home Energy Assessment. Technicians will directly install weatherization measures (infiltration and duct sealing), typically outside of the assessment due to the service time. Additionally, IPL coordinates with program contractors (those registered in IPL's Quality Contractor Network), who install the equipment and submit the rebate application for customers. IPL offered rebates for five measures through the 2020 Whole Home program:

- SEER 16+ central ACs
- SEER 16+ heat pumps
- Heat pump water heaters
- Mini Splits 19+ SEER
- Attic Insulation

Research Objectives

The evaluation team conducted process and impact evaluations to assess the 2020 Whole Home program and address three research objectives:

- Calculate program savings, including establishing ISRs and NTG values for kit, direct install, and rebated measures
- Measure customer satisfaction with the program and the virtual assessment
- Identify ways IPL can improve the program

Research Approach

The evaluation team conducted various activities for the process and impact evaluations:

- Interviewed IPL program staff
- Reviewed the program tracking database
- Conducted an engineering review of savings assumptions
- Conducted a survey with 2020 assessment, kit, and rebate participants
- Estimated ISR and NTG values from primary research

Program Performance

In 2020, IPL achieved 3,276,956 kWh of *ex post* net energy savings and 1,226 kW of *ex post* net demand reduction, achieving 51% of the energy-savings goal and 90% of the demand reduction goal (Table 165). These 2020 energy savings are lower than those in 2019, when IPL achieved 64% of its energy-savings

goal, while the 2020 demand reduction is higher than that in 2019, when IPL achieved 38% of its demand reduction goal. This is primarily attributable to the high volume of central AC and heat pump rebates issued in 2020, which proportionately contribute more to demand reduction than to energy savings.

Some program participants received both energy-savings kits and direct install measures during an eScore Home Energy Assessment. Program staff reported that this is intentional and allowed per program design. However, program participants who receive an energy-savings kit after receiving an eScore Home Energy Assessment and direct install measures may have more limited savings opportunities, particularly for 9-watt and 16-watt LED bulbs and for water saving devices.

The reported program participation on the scorecard does not capture the full extent of 2020 participation since the scorecard's participation metric is based on the number of audits conducted during the program year and does not include customers who only received an energy-saving kit or only received a rebate. In total, the program reached 13,845 distinct customers (about 232% of the participation goal) during 2020, despite being unable to administer the program as designed due to safety concerns related to the pandemic. Participation totals in Table 165 do not include kit customers for consistency with IPL's scorecard.

Table 165. 2020 Whole Home Program Expenditures, Participation, and Savings

Metric	Net Goal	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	6,394,857	3,276,956	51%
Demand Reduction (kW)	1,362	1,226	90%
Participation (Homes)	5,979	1,300	22%
Budget	$3,896,600	$3,551,384	91%

Note: Values rounded for reporting purposes.

Table 166 provides evaluated results—including audited, verified, *ex post* gross, and *ex post* net savings—for the 2020 Whole Home program.

Table 166. 2020 Whole Home Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Energy Savings (kWh)	6,581,271	6,578,940	3,499,452	4,141,387	3,276,956
Demand Reduction (kW)	2,147	2,119	1,502	1,711	1,226

As shown in Table 167, the program energy-savings realization rate was 63% and the demand reduction realization rate was 80%. The evaluation team made adjustments that impacted the energy savings, demand reduction, and realization rates.

Table 167. 2020 Whole Home Program Realization Rates and Net-to-Gross Summary

Metric	Realization Rate	Freeridership	Spillover	NTG
Energy Savings (kWh)	63%	21%	0%	79%
Demand Reduction (kW)	80%	28%	0%	72%

The demand reduction realization rate is higher than the energy savings realization rate because of high participation with the central AC and heat pump rebates. The number of rebates issued for these measures in 2020 increased by 264% compared to 2019. These measure rebates accounted for 81% of the total *ex post* gross demand reduction and 28% of the total *ex post* gross energy savings, which caused an imbalance between the energy savings and demand reduction results.

The overall program realization rates were lower than 100% because of adjustments the evaluation team made to the kit measure savings. These adjustments are consistent with the approach used in both the 2018 and 2019 evaluations; however, the impact of these adjustments was greater in 2020 since the energy-saving kits contributed 41% of program savings compared to 17% in 2019:

- ***Furnace whistles.*** The team applied *ex post* savings values to furnace whistles based on the fuel type of participant's cooling and heating systems (electric only, natural gas, other). The evaluation team assigned demand reduction only to the portion of customers with central AC.
- ***Water saving measures.*** The team made savings adjustments to bathroom and kitchen faucet aerators and low-flow showerheads in cases where energy-savings kits were sent to homes with non-electric water heating.
- ***Other kit adjustments.*** The team made savings adjustments to 9-watt and 16-watt LEDs, bathroom and kitchen faucet aerators, and low-flow showerheads in cases where energy-saving kits were sent to homes that received the kit after already receiving an in-person Home Energy Assessment. We also adjusted the furnace whistle savings in cases where multiple energy-saving kits were sent to the same customer.

These approaches are detailed below in the *Ex Post Net Savings* section.

The overall energy savings and demand reduction increased between the verified and *ex post* gross savings values because of lighting measures. Overall, the lighting measures had high realization rates because CLEAResult used lower baseline wattages for *ex ante* savings than the team used for *ex post* savings. For more details, see the *Ex Post Gross Savings* section below.

Impact Evaluation

The evaluation team calculated audited, verified gross, *ex post* gross, and *ex post* net energy savings and demand reduction for each measure and for the program overall; each of these steps is detailed in the following subsections.

Audited Savings

The evaluation team reviewed the program tracking database to confirm that measure quantities aligned with the program design and that deemed values were applied appropriately. When the team applied the savings values uniformly during the audit stage, the energy savings decreased by about 2,331 kWh and the demand reduction decreased by about 28 kW. Almost all the in-person audit measures with deemed savings were affected by this adjustment (except the programmable thermostats and audit recommendation). Table 168 shows *ex ante* and audited quantities and savings per unit. Audited savings reflect the adjustments described above.

Table 168. 2020 Whole Home Program *Ex Ante* and Audited Quantities and Savings

Measure	*Ex Ante* Quantity	*Ex Ante* Savings		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
In-Person Audit						
16-Watt LED	372	1.221	8,914.31	372	1.153	8,463.00
5-Watt LED Candelabra	2,023	1.831	11,188.53	2,023	1.821	11,146.73
5-Watt LED Globe	2,280	4.362	29,658.26	2,280	4.332	29,617.20
7-Watt LED Track Light	305	0.221	1,613.83	305	0.244	1,671.40
9-Watt LED	4,336	5.699	41,146.42	4,336	5.637	39,587.68
Exterior 9-Watt LED	120	-	2,050.15	120	-	2,070.00
R30 LED	1,474	3.477	21,682.58	1,474	3.390	21,240.34
Bathroom Aerator	162	0.485	5,319.42	162	0.486	5,310.36
Kitchen Aerator	44	12.732	7,709.94	44	3.049	7,755.44
Low-Flow Showerhead	236	38.424	79,854.53	236	21.287	79,940.28
Programmable Thermostat (Natural Gas Heat + Central AC)	6	-	683.84	6	-	683.84
Smart Thermostat with Enrollment (Heat Pump)	265	-	141,481.57	265	-	141,480.85
Smart Thermostat with Enrollment (Electric Heat + Central AC)	162	-	182,060.80	162	-	182,060.46
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	677	-	80,418.59	677	-	80,420.83
Smart Thermostat without Enrollment (Heat Pump)	2	-	1,413.15	2	-	1,413.15
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	1	-	62.05	1	-	62.05
Pipe Wrap	286	0.859	6,443.22	286	0.860	6,443.22
Water Heater Setback	37	0.444	3,895.14	37	0.444	3,895.14
Audit Recommendation	1,003	-	188,080.42	1,003	-	188,082.56
Virtual Audit						
16-Watt LED	45	0.138	1,005.71	45	0.140	1,005.71
5-Watt LED Candelabra	331	1.200	8,758.13	331	1.192	8,758.13
5-Watt LED Globe	486	1.762	12,859.36	486	1.750	12,859.37
7-Watt LED Track Light	64	0.281	2,051.18	64	0.282	2,051.17
9-Watt LED	645	0.724	5,285.55	645	0.710	5,285.58
Exterior 9-Watt LED	23	-	1,105.87	23	-	1,105.87
R30 LED	476	2.771	20,222.58	476	2.761	20,222.57
Bathroom Aerator	126	0.396	4,154.72	126	0.391	4,154.72
Kitchen Aerator	27	0.218	4,766.93	27	0.219	4,766.93
Low-Flow Showerhead	101	1.677	34,254.86	101	1.677	34,254.86
Smart Power Strip	55	1.485	8,250.00	55	1.485	8,250.00
Audit Recommendation	297	-	55,693.44	297	-	55,693.44
Rebate Measures						
Central AC Tune-Up	191	27.836	11,376.63	191	27.836	11,376.63
Heat Pump Tune-Up	70	10.158	17,632.58	70	10.159	17,632.58
Heat Pump Water Heater	6	1.419	10,182.62	6	1.419	10,182.62
Central AC SEER 16	692	489.058	203,840.59	692	489.058	203,840.59

Measure	*Ex Ante* Quantity	*Ex Ante* Savings		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
Central AC SEER 17	285	244.881	105,735.31	285	244.884	105,735.31
Central AC SEER 18+	105	121.148	54,463.76	105	121.147	54,463.76
Heat Pump SEER 16	184	132.346	205,577.98	184	132.347	205,577.98
Heat Pump SEER 17	131	112.373	202,814.53	131	112.374	202,814.53
Heat Pump SEER 18+	68	66.439	123,610.89	68	66.439	123,610.89
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	6	6.268	18,791.10	6	6.268	18,791.10
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	4	7.250	108,424.98	4	7.250	108,424.98
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	9	2.909	7,019.81	9	2.909	7,019.81
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	6	8.025	23,289.79	6	8.025	23,289.79
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	3	5.192	58,689.03	3	5.192	58,689.03
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	1	0.815	8,429.03	1	0.815	8,429.03
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	16	5.594	13,341.77	16	5.594	13,341.77
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	7	10.193	32,779.46	7	10.193	32,779.46
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	4	9.570	148,148.49	4	9.570	148,148.49
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	1	0.618	5,608.96	1	0.618	5,608.96
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	10	5.431	13,547.45	10	5.431	13,547.45
Weatherization Measures						
Air Sealing (Electric Heat + Central AC)	6	0.979	9,285.80	6	0.979	9,285.80
Air Sealing (Heat Pump)	10	0.442	5,174.13	10	0.442	5,174.13
Attic Insulation R-12 to R-49 (Heat Pump)	1	0.542	2,528.05	1	0.542	2,528.05
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	6	1.961	2,589.27	6	1.961	2,589.27
Attic Insulation R≤11 to R-49 (Heat Pump)	1	1.209	5,636.86	1	1.209	5,636.86
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	3	3.007	30,466.32	3	3.008	30,466.32
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	9	6.472	8,547.43	9	6.472	8,547.43
Duct Sealing (Heat Pump)	3	0.415	895.86	3	0.415	895.86
Duct Sealing (Electric Heat + Central AC)	3	0.251	1,287.71	3	0.251	1,287.71

Measure	*Ex Ante* Quantity	*Ex Ante* Savings		Audited Quantity	Audited Savings	
		kW	kWh		kW	kWh
2020 Kits Combined						
11-Watt LED	8,959	15.553	113,460.99	8,959	15.230	113,461.26
16-Watt LED	8,960	27.453	200,247.61	8,960	27.776	200,247.94
9-Watt LED	8,959	10.061	73,415.93	8,959	9.855	73,416.32
LED Night-Light	8,960	-	122,182.14	8,960	-	122,182.14
Bathroom Aerator	8,960	28.143	295,447.04	8,960	27.776	295,447.04
Kitchen Aerator	2,321	18.712	409,779.51	2,321	18.800	409,779.51
Low-Flow Showerhead	2,321	38.543	787,183.40	2,321	38.529	787,183.40
Smart Power Strip	2,952	79.704	442,800.00	2,952	79.704	442,800.00
Furnace Whistle	8,960	434.784	1,228,416.00	8,960	434.560	1,228,416.00
Whole Home - Direct Install Kit	**2,371**	**130.519**	**496,537.19**	**2,371**	**130.405**	**496,537.19**
Three 9-Watt LEDs		-	-	-	-	-
LED Night-Light		-	-	-	-	-
Bathroom Aerator		-	-	-	-	-
Furnace Whistle		-	-	-	-	-
Total	**82,031**	**2,147**	**6,581,271**	**82,031**	**2,119**	**6,578,940**

During the audit, the team identified a few aspects of the tracking data that could be improved for more precise tracking. While we made no adjustments based on these findings, they are detailed below to support improvements to future data tracking.

We do not include data tracking improvements as specific recommendations within this report, because IPL is rolling the Whole Home program into the Efficient Products program for 2021 and will have different offerings and implementation:

- ***Virtual and in-person audits.*** There was no indicator in the tracking data to differentiate between customers who received an in-person audit and those who received a virtual audit. The evaluation team was able to distinguish the audits in 2020 based on the start date of the virtual audits (June 1) and because no in-person audits were conducted after March. However, if both audit options are offered concurrently in the future, there would not be a clear way to distinguish between them, especially since most of the measures overlap. Being able to differentiate between the audit types is important to accurately evaluate program savings, since (as described further in the *Verified Savings* section), the virtual audit relies on customers installing the measures rather than a CLEAResult technician, which can impact measure ISRs. It will also be important to be able to appropriately identify customers by audit participation type for future research efforts, such as customer surveys.
- ***Virtual audit measures.*** The virtual audit measures were inconsistently tracked within the program data. After the virtual audit, customers are eligible to receive a custom kit curated by the CLEAResult.[48] Some virtual audit measures were associated with a custom kit flag within the

[48] Program staff noted that if the measures identified during the virtual audit matched the contents of an existing prescriptive kit, the program would send customers a prescriptive kit to streamline its delivery.

program data, while others were tracked identically to the in-person direct install measures. In some cases, described further in the *Verified Savings* section, customers appear to have been sent more than one of the prescriptive energy-savings kits (the Home Starter, Tech-Savvy, or Bathroom Refresher kit) rather than a custom kit following their virtual assessment. Tracking the virtual audit measures will help distinguish between the in-person and virtual audits and ensure that customers' experience with the virtual audits aligns with the program design.

Verified Savings

To determine verified measure quantities, the evaluation team applied verification and ISRs to audited savings for all measures to the respective audited measure quantities. To calculate verified savings, the team adjusted audited savings by replacing the *ex ante* ISR with the verified ISR.[49]

In-Service Rates

The evaluation team calculated ISRs for 2020 (listed in Table 169) using measure-level primary data from the 2020 participant survey. The team increased the Whole Home participant survey target from 140 to 210:

- 70 kit-only respondents
- 70 audit respondents
- 70 rebate-only respondents

Despite this, because of limited customer responses for certain direct install measures, most sample sizes at the measure level were relatively small (under 20), especially for bathroom and kitchen faucet aerators and showerheads, affecting the ability to verify ISRs with confidence. The evaluation team assumed an ISR of 100% for these measures since the program is designed so these measures are directly installed (and customers would have to remove them after the visit for ISR to drop below 100%). This is consistent with the approach in 2018 and 2019.

To reduce survey fatigue, we did not ask participants about measures with a limited likelihood of removal; this included pipe wrap, heat pump water heaters, and air and duct sealing. The team also assumed an ISR of 100% for these measures.

[49] For more details on how installation rates are calculated, please see *Appendix L*.

Table 169. 2020 Whole Home Program In-Service Rates

Measure	ISR	Source	Number Surveyed
Direct Install Measures			
LED	97%	2020 Whole Home Survey	26
Bathroom Aerator [a]	100%	2020 Whole Home Survey	2
Kitchen Aerator [a]	100%	2020 Whole Home Survey	1
Low-Flow Showerhead [a]	100%	2020 Whole Home Survey	5
Pipe Wrap	100%	Assumed	N/A
Programmable Thermostat [a]	100%	2020 Whole Home Survey	0
Smart Thermostat	96%	2020 Whole Home Survey	24
Water Heater Setback	100%	Assumed	N/A
Audit Recommendation	100%	Assumed	N/A
Virtual Audit			
LED [b]	78%	2020 Whole Home Survey	21
Bathroom Aerator [c]	27%	2020 Whole Home Survey	129
Kitchen Aerator [c]	60%	2020 Whole Home Survey	25
Low-Flow Showerhead [c]	44%	2020 Whole Home Survey	25
Smart Strip [c]	79%	2020 Whole Home Survey	33
Audit Recommendation	100%	Assumed	N/A
Rebate Measures			
Central AC Tune-Up	100%	Assumed	N/A
Heat Pump Tune-Up	100%	Assumed	N/A
Central AC [d]	100%	Assumed	1
Heat Pump [d]	100%	Assumed	2
Mini-Split Heat Pump	100%	Assumed	N/A
Heat Pump Water Heater	100%	Assumed	N/A
Weatherization Measures			
Air Sealing	100%	Assumed	N/A
Duct Sealing	100%	Assumed	N/A
Attic Insulation	100%	Assumed	N/A
Energy-Saving Kit Measures			
LED [b]	87%	2020 Whole Home Survey	129
LED Night-Light	76%	2020 Whole Home Survey	129
Bathroom Aerator	27%	2020 Whole Home Survey	129
Kitchen Aerator	60%	2020 Whole Home Survey	25
Low-Flow Showerhead	44%	2020 Whole Home Survey	25
Smart Strip	79%	2020 Whole Home Survey	33
Furnace Whistle	8%	2020 Whole Home Survey	129

[a] Given the small n, the team applied ISRs of 100% for these measures.

[b] This is the cumulative lifetime ISR that includes adjustments for carryover bulbs. The Indiana TRM (v2.2) does not have an up-to-date deemed ISR value for LEDs, so the team referenced the 2016 Pennsylvania TRM to establish the first-year ISR.

[c] Given the small n, the team applied ISRs from the energy-saving kit measures because the measure delivery is similar. For both the virtual audit and energy-saving kits, CLEAResult mails measures to customers, who must install them.

[d] To reduce survey fatigue, we did not ask participants about measures with a limited likelihood of removal, instead assuming a 100% installation rate for these measures.

Carryover Bulbs

The evaluation team used a carryover bulb approach, described in the UMP and consistent with IPL's Lighting and Appliance program, to estimate carryover bulbs for the Whole Home program energy-savings kits. Carryover bulbs were placed in storage during the first program year but installed in subsequent program years. The UMP recommends a 24% trajectory estimate, assuming that 24% of the remaining in-storage bulbs are installed in each subsequent year.

The team applied the initial first-year ISR of 74% for kit measures (after extrapolating the estimated lifetime ISR for these bulbs using the 24% estimate plus a discount factor to account for the delay in installation). The team used this lifetime ISR instead of the originally calculated ISR for LEDs in the energy-savings kits to account for the future installation of bulbs in storage (per Table 170).

Table 170. 2020 Whole Home Program Adjusted Lifetime Installation Rates for Kit Lighting Measures

Year	Calendar Year	Cumulative ISR
Year 1	2020	74%
Year 2	2021	80%
Year 3	2022	84%
Year 4	2023	87%

Since the virtual audit measures are mailed to customers, who are then responsible for installing them, the team applied the initial first-year ISR of 58% for virtual audit measures (after extrapolating the estimated lifetime ISR for these bulbs using the 24% estimate plus a discount factor to account for the delay in installation). The team used this lifetime ISR instead of the originally calculated ISR for LEDs in the virtual audit kits to account for the future installation of bulbs in storage (per Table 171).

Table 171. 2020 Whole Home Program Adjusted Lifetime Installation Rates for Virtual Audit Lighting Measures

Year	Calendar Year	Cumulative ISR
Year 1	2020	58%
Year 2	2021	67%
Year 3	2022	74%
Year 4	2023	78%

Overall Verified Measure Quantity

To calculate verified quantities, the evaluation team applied the updated ISRs, including the LED lifetime installation rates developed to account for carryover bulbs, to the audited *ex ante* measure unit quantities.

The program does not track kit recipients' space heating and cooling systems or water heating fuel types. Any IPL customer, regardless of their HVAC system or water heating fuel, will receive the same kit contents. Accordingly, customers with non-electric or incompatible systems can still receive the kits but

IPL cannot claim energy saving or demand reduction in these cases. The evaluation team made two adjustments that impacted energy kit savings related to fuel type:

- ***Assigned savings for the bathroom and kitchen faucet aerators and showerheads to the proportion of participants with an electric water heater***. CLEAResult does not track water heating fuels for kit recipients. As such, the program *ex ante* kit savings assume that all kit customers have electric water heating. In accordance with the Indiana TRM (v2.2), the evaluation team assumed that 27% of customers who received a kit have electric water heating and therefore we only counted savings for those measures from 27% of kit customers.[50]
- ***Applied four verified per-unit savings values for the furnace whistle to account for the proportion of participants with different types of HVAC systems and fuels.*** The *ex ante* savings for furnace whistles assume savings from both heating and cooling. However, CLEAResult does not track the occurrence of central AC, heat pumps, or non-electric heating for kit recipients. Accordingly, the team applied four different per-unit savings values to the furnace whistle:
  - Participants with electric heating only: 110.58 kWh and 0 kW
  - Participants with electric heating and central AC: 137.10 kWh and 0.049 kW
  - Participants with non-electric heating and central AC: 36.53 kWh and 0.049 kW
  - Participants with no electric heating and no central AC: 0 kWh and 0 kW[51]

The evaluation team made two other adjustments that impacted energy kit savings:

- ***Removed double-counted savings.*** The team examined the tracking data for any customers who received both an energy-savings kit and direct install measures through an in-person Home Energy Assessment. According to CLEAResult, technicians install 9-watt LEDs, 16-watt LEDs, bathroom faucet aerators, kitchen faucet aerators, and showerheads in all eligible locations during an in-person assessment.[52] Therefore, if an in-person audit customer then receives a kit, there would not be any eligible sockets or sinks to install those overlapping measures. Accordingly, the evaluation team removed any savings resulting from these measures when the recipient received a kit after their in-person assessment. This approach is consistent with the 2019 and 2018 evaluations.[53] This affected 41 customers, of which six received one of the three new kits and 35 received the previous energy-savings kit.

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[50] Per the Indiana TRM (v2.2), about 27% of Indiana households use electric water heating.

[51] Per the Indiana TRM (v2.2), about 63% of Indiana households have central AC and natural gas heating, 4% have a heat pump, 18% have central AC and electric heat, 2% have electric heat and no central AC, and 13% only have natural gas heat.

[52] CLEAResult instructs technicians to prioritize installing direct install measures in high-usages fixtures in frequently used area, rather than in lower-usage fixtures (like a utility closets). That said, the program is intended to maximize opportunities to install energy-saving measures, which is a main reason the program does not have strictly defined or enforced measures limits per household.

[53] The team did not use this approach for the virtual audits because the custom kits are delivered *after* the audit measure is submitted to the tracking data (since the virtual audit is used to inform the kit contents).

- ***Removed extra furnace whistles.*** Some customers received multiple prescriptive energy-savings kits. For example, one customer received one Home Efficiency Starter kit and two Bathroom Refresher kits. Accordingly, they received three gift cards, three furnace whistles, three bathroom aerators, two showerheads, two kitchen aerators, and nine LEDs total (three each of the 9-watt, 11-watt, and 16-watt). The evaluation team assumed that there *might* be eligible sockets and fixtures to install multiple LEDs and water savings devices; however, there is typically only one furnace per household where a furnace whistle can be installed. Accordingly, the team credited the program with a maximum of one furnace whistle per household[54] and removed the duplicates. There were 110 households with more than one kit—18 received three kits and 92 received two kits—which resulted in 128 furnace whistles being removed from the savings calculations.

The resulting verified quantity was 64,076 measures (Table 172).

Table 172. 2020 Whole Home Program Audited and Verified Quantities

Measure	Audited Quantity	Installation Rate	Verified Quantity
In-Person Audit			
16-Watt LED	372	97%	361
5-Watt LED Candelabra	2,023	97%	1,962
5-Watt LED Globe	2,280	97%	2,212
7-Watt LED Track Light	305	97%	296
9-Watt LED	4,336	97%	4,206
Exterior 9-Watt LED	120	97%	116
R30 LED	1,474	97%	1,430
Bathroom Aerator	162	100%	162
Kitchen Aerator	44	100%	44
Low-Flow Showerhead	236	100%	236
Programmable Thermostat (Natural Gas Heat + Central AC)	6	100%	6
Smart Thermostat with Enrollment (Heat Pump)	265	96%	254
Smart Thermostat with Enrollment (Electric Heat + Central AC)	162	96%	156
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	677	96%	650
Smart Thermostat without Enrollment (Heat Pump)	2	96%	2
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	1	96%	1
Pipe Wrap	286	100%	286
Water Heater Setback	37	100%	37
Audit Recommendation	1,003	100%	1,003

[54] The evaluation team defined a household as a record with a unique premise ID in the program tracking data.

Measure	Audited Quantity	Installation Rate	Verified Quantity
Virtual Audit			
16-Watt LED [a]	45	78%	35
5-Watt LED Candelabra [a]	331	78%	258
5-Watt LED Globe [a]	486	78%	379
7-Watt LED Track Light [a]	64	78%	50
9-Watt LED [a]	645	78%	503
Exterior 9-Watt LED [a]	23	78%	18
R30 LED [a]	476	78%	371
Bathroom Aerator	126	27%	34
Kitchen Aerator	27	60%	16
Low-Flow Showerhead	101	44%	44
Smart Power Strip	55	79%	43
Audit Recommendation	297	100%	297
Rebate Measures			
Central AC Tune-Up	191	100%	191
Heat Pump Tune-Up	70	100%	70
Heat Pump Water Heater	6	100%	6
Central AC SEER 16	692	100%	692
Central AC SEER 17	285	100%	285
Central AC SEER 18+	105	100%	105
Heat Pump SEER 16	184	100%	184
Heat Pump SEER 17	131	100%	131
Heat Pump SEER 18+	68	100%	68
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	6	100%	6
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	4	100%	4
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	9	100%	9
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	6	100%	6
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	3	100%	3
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	1	100%	1
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	16	100%	16
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	7	100%	7
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	4	100%	4
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	1	100%	1
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	10	100%	10
Weatherization Measures			
Air Sealing (Electric Heat + Central AC)	6	100%	6
Air Sealing (Heat Pump)	10	100%	10
Attic Insulation R-12 to R-49 (Heat Pump)	1	100%	1
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	6	100%	6
Attic Insulation R≤11 to R-49 (Heat Pump)	1	100%	1
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	3	100%	3
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	9	100%	9
Duct Sealing (Heat Pump)	3	100%	3
Duct Sealing (Electric Heat + Central AC)	3	100%	3

Measure	Audited Quantity	Installation Rate	Verified Quantity
2020 Kits Combined			
11-Watt LED [a]	8,959	87%	7,794
16-Watt LED [a]	8,960	87%	7,790
9-Watt LED [a]	8,959	87%	7,789
LED Night-Light	8,960	76%	6,810
Bathroom Aerator (Electric)	2,419	27%	652
Bathroom Aerator (Non-Electric)	6,541	27%	1,766
Kitchen Aerator (Electric)	627	60%	372
Kitchen Aerator (Non-Electric)	1,694	60%	1,017
Low-Flow Showerhead (Electric)	627	44%	273
Low-Flow Showerhead (Non-Electric)	1,694	44%	746
Smart Power Strip	2,952	79%	2,332
Furnace Whistle (Central AC Only)	5,645	8%	445
Furnace Whistle (Electric Cooling + Heat)	1,613	8%	127
Furnace Whistle (Heating Only)	179	8%	14
Furnace Whistle (Natural Gas Heat + No Central AC)	1,523	8%	120
Whole Home - Direct Install Kit			
9-Watt LED [a]	7,113	87%	6,097
LED Night-Light	2,371	76%	1,802
Bathroom Aerator (Electric)	640	27%	170
Bathroom Aerator (Non-Electric)	1,731	27%	460
Furnace Whistle (Central AC Only)	1,494	8%	119
Furnace Whistle (Electric Cooling + Heat)	427	8%	34
Furnace Whistle (Heating Only)	47	8%	4
Furnace Whistle (Natural Gas Heat + No Central AC)	403	8%	32
Total	**93,886**	**-**	**64,076**

Note: Values rounded for reporting purposes.

[a] The ISR for energy savings from LEDs distributed through the energy-saving kit and virtual audit paths are the cumulative lifetime ISR that includes adjustments to account for carryover bulbs through 2023.

Overall Verified Measure Savings

The team applied the ISRs and measure quantities to calculate verified savings. Table 173 shows the verified savings per measure.

Table 173. 2020 Whole Home Program Audited and Verified Savings

Measure	Audited *Ex Ante* Savings (with Embedded ISR)		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
In-Person Audit					
16-Watt LED	1.153	8,463.00	97%	1.216	8,922.95
5-Watt LED Candelabra	1.821	11,146.73	97%	1.840	11,262.84
5-Watt LED Globe	4.332	29,617.20	97%	4.377	29,925.71
7-Watt LED Track Light	0.244	1,671.40	97%	0.247	1,688.81

Measure	Audited *Ex Ante* Savings (with Embedded ISR)		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
9-Watt LED	5.637	39,587.68	97%	5.943	41,739.18
Exterior 9-Watt LED	-	2,070.00	97%	-	2,182.50
R30 LED	3.390	21,240.34	97%	3.426	21,461.59
Bathroom Aerator	0.486	5,310.36	100%	0.486	5,310.36
Kitchen Aerator	3.049	7,755.44	100%	3.049	7,755.44
Low-Flow Showerhead	21.287	79,940.28	100%	21.287	79,940.28
Programmable Thermostat (Natural Gas Heat + Central AC)	-	683.84	100%	-	683.84
Smart Thermostat with Enrollment (Heat Pump)	-	141,480.85	96%	-	135,821.62
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	182,060.46	96%	-	174,778.04
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	80,420.83	96%	-	77,204.00
Smart Thermostat without Enrollment (Heat Pump)	-	1,413.15	96%	-	1,356.62
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	-	62.05	96%	-	59.57
Pipe Wrap	0.860	6,443.22	100%	0.887	7,676.81
Water Heater Setback	0.444	3,895.14	100%	0.688	6,035.78
Audit Recommendation	-	188,082.56	100%	-	188,082.56
Virtual Audit					
16-Watt LED [a]	0.140	1,005.71	78%	0.109	784.45
5-Watt LED Candelabra [a]	1.192	8,758.13	78%	0.929	6,831.34
5-Watt LED Globe [a]	1.750	12,859.37	78%	1.365	10,030.31
7-Watt LED Track Light [a]	0.282	2,051.17	78%	0.220	1,599.92
9-Watt LED [a]	0.710	5,285.58	78%	0.553	4,122.75
Exterior 9-Watt LED [a]	-	1,105.87	78%	-	862.58
R30 LED [a]	2.761	20,222.57	78%	2.153	15,773.61
Bathroom Aerator	0.391	4,154.72	27%	0.105	1,121.78
Kitchen Aerator	0.219	4,766.93	60%	0.131	2,860.16
Low-Flow Showerhead	1.677	34,254.86	44%	0.738	15,072.14
Smart Power Strip	1.485	8,250.00	79%	1.173	6,517.50
Audit Recommendation	-	55,693.44	100%	-	55,693.44
Rebate Measures					
Central AC Tune-Up	27.836	11,376.63	100%	27.836	11,376.63
Heat Pump Tune-Up	10.159	17,632.58	100%	10.159	17,632.58
Heat Pump Water Heater	1.419	10,182.62	100%	1.419	10,182.62
Central AC SEER 16	489.058	203,840.59	100%	489.058	203,840.59
Central AC SEER 17	244.884	105,735.31	100%	244.884	105,735.31
Central AC SEER 18+	121.147	54,463.76	100%	121.147	54,463.76
Heat Pump SEER 16	132.347	205,577.98	100%	132.347	205,577.98
Heat Pump SEER 17	112.374	202,814.53	100%	112.374	202,814.53
Heat Pump SEER 18+	66.439	123,610.89	100%	66.439	123,610.89

Measure	Audited *Ex Ante* Savings (with Embedded ISR)		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	6.268	18,791.10	100%	6.268	18,791.10
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	7.250	108,424.98	100%	7.250	108,424.98
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	2.909	7,019.81	100%	2.909	7,019.81
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	8.025	23,289.79	100%	8.025	23,289.79
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	5.192	58,689.03	100%	5.192	58,689.03
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	0.815	8,429.03	100%	0.815	8,429.03
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	5.594	13,341.77	100%	5.594	13,341.77
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	10.193	32,779.46	100%	10.193	32,779.46
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	9.570	148,148.49	100%	9.570	148,148.49
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	0.618	5,608.96	100%	0.618	5,608.96
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	5.431	13,547.45	100%	5.431	13,547.45
Weatherization Measures					
Air Sealing (Electric Heat + Central AC)	0.979	9,285.80	100%	0.979	9,285.80
Air Sealing (Heat Pump)	0.442	5,174.13	100%	0.442	5,174.13
Attic Insulation R-12 to R-49 (Heat Pump)	0.542	2,528.05	100%	0.542	2,528.05
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	1.961	2,589.27	100%	1.961	2,589.27
Attic Insulation R≤11 to R-49 (Heat Pump)	1.209	5,636.86	100%	1.209	5,636.86
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	3.008	30,466.32	100%	3.008	30,466.32
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	6.472	8,547.43	100%	6.472	8,547.43
Duct Sealing (Heat Pump)	0.415	895.86	100%	0.415	895.86
Duct Sealing (Electric Heat + Central AC)	0.251	1,287.71	100%	0.251	1,287.71

Measure	Audited *Ex Ante* Savings (with Embedded ISR)		Installation Rate	Verified *Ex Ante* Savings (with Calculated ISR)	
	kW	kWh		kW	kWh
2020 Kits Combined					
11-Watt LED [a]	15.230	113,461.256	87%	15.057	112,171.92
16-Watt LED [a]	27.776	200,247.936	87%	27.442	197,839.82
9-Watt LED [a]	9.855	73,416.317	87%	9.736	72,533.43
LED Night-Light	-	122,182.144	76%	-	92,858.43
Bathroom Aerator (Electric)	7.500	79,770.701	27%	2.020	21,484.67
Bathroom Aerator (Non-Electric)	20.276	215,676.339	27%	-	-
Kitchen Aerator (Electric)	5.076	110,640.469	60%	3.016	65,748.69
Kitchen Aerator (Non-Electric)	13.724	299,139.044	60%	-	-
Low-Flow Showerhead (Electric)	10.403	212,539.517	44%	4.533	92,622.01
Low-Flow Showerhead (Non-Electric)	28.126	574,643.880	44%	-	-
Smart Power Strip	79.704	442,800.000	79%	62.966	349,812.00
Furnace Whistle (Central AC Only)	273.773	773,902.080	8%	21.600	16,258.48
Furnace Whistle (Electric Cooling + Heat)	78.221	221,114.880	8%	6.171	17,436.49
Furnace Whistle (Heating Only)	8.691	24,568.320	8%	-	1,421.25
Furnace Whistle (Natural Gas Heat + No Central AC)	73.875	208,830.720	8%	-	-
Whole Home - Direct Install Kit	**130.405**	**496,537.19**		**15.612**	**96,390.57**
9-Watt LED [a]	-	-	87%	7.621	56,775.86
LED Night-Light	-	-	76%	-	24,572.25
Bathroom Aerator (Electric)	-	-	27%	0.535	5,615.32
Bathroom Aerator (Non-Electric)	-	-	27%	-	-
Furnace Whistle (Central AC Only)	-	-	8%	5.799	4,364.68
Furnace Whistle (Electric Cooling + Heat)	-	-	8%	1.657	4,680.92
Furnace Whistle (Heating Only)	-	-	8%	-	381.54
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	8%	-	-
Total	**2,119**	**6,578,940**		**1,502**	**3,499,452**

Note: Values rounded for reporting purposes.

[a] The ISR for energy savings from LEDs distributed through the energy-saving kit and virtual audit paths are the cumulative lifetime ISR that includes adjustments to account for carryover bulbs through 2023.

Ex Post Gross Savings

The evaluation team calculated 2020 *ex post* gross per-measure savings using algorithms and variable assumptions from the Indiana TRM (v2.2) and the UMP, similar to the 2018 and 2019 analyses. Discrepancies with LEDs accounted for the greatest differences between *ex ante* and *ex post* assumptions. *Appendix L* presents the algorithms, variable assumptions, and specific references for all program measure *ex post* calculations. It also contains detailed explanations of the differences between *ex ante* and *ex post* savings.

The differences in baseline wattages (shown in Table 174) used to calculate savings for lighting measures is the primary reason for the variation between *ex ante* and *ex post* gross savings, as well as

for the high realization rates across lighting measures. CLEAResult used lower baseline wattages in 2020 than in 2019, while the evaluation team used the same baseline wattages in both years. CLEAResult likely used lower baseline wattages in anticipation of the EISA backstop. However, since the EISA backstop was not implemented (and incandescent bulbs are still available in the market), the evaluation team still factored halogen bulbs into the baseline wattages for the *ex post* savings values. The evaluation team applied UMP baseline wattages based on a range of 450 lumens to 1,599 lumens. In addition, for the kit LED measures, the team applied the Indiana TRM (v2.2) assumption of kit AOH, which resulted in higher realization rates for kit LEDs versus direct install LEDs. Direct install and kit AOH are provided in *Appendix L*.

Table 174. 2019 and 2020 Whole Home Program LED Baseline Wattages

Measure	*Ex Ante*		*Ex Post*	
	2019	2020	2019	2020
9-Watt LED	30.42	20.00	43.00	43.00
16-Watt LED	54.56	46.00	65.00	65.00
5-Watt Globe LED	40.00	20.00	40.00	40.00
5-Watt Candelabra LED	40.00	9.00	40.00	40.00
7-Watt Track LED	29.00	13.00	50.00	50.00
9-Watt Exterior LED	30.42	20.00	43.00	43.00
R30 LED	65.00	24.00	65.00	65.00

There is also a difference between the *ex ante* and *ex post* gross energy savings for the water heater setback, which resulted from the actual tank size and water heater temperature conditions only being captured for 11 of 37 water heater setback projects. When the actual conditions were not available, the team applied the Indiana TRM (v2.2)–based assumptions for the water heater tank size and outlet temperature prior to setback.

The differences between the *ex ante* and *ex post* gross demand reduction for the kitchen faucet aerator and low-flow showerhead results from CLEAResult using a deemed savings value for the *ex ante* savings while the team used an approach from the Indiana TRM (v2.2) to calculate *ex post* savings. The *ex post* demand reduction values for both measures align with the *ex ante* and *ex post* demand reduction values for the same measures offered through the IQW program, as well as with the example calculations in the Indiana TRM (v2.2), whereas the *ex ante* deemed savings values differ significantly from these sources.

Table 175 shows a comparison of total *ex ante* deemed savings and total *ex post* gross savings by measure. Applying realization rates to each measure, the table shows savings variations between *ex ante* and *ex post* gross savings.

Table 175. 2020 Whole Home Program *Ex Ante* and *Ex Post* Savings Measure Summary

Measure	*Ex Ante* Savings (With Embedded ISRs) [a]		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
In-Person Audit						
16-Watt LED	1.221	8,914.31	2.052	14,975.55	168%	168%
5-Watt LED Candelabra	1.831	11,188.53	7.970	58,171.17	435%	520%
5-Watt LED Globe	4.362	29,658.26	8.983	65,561.18	206%	221%
7-Watt LED Track Light	0.221	1,613.83	1.476	10,774.87	668%	668%
9-Watt LED	5.699	41,146.42	16.595	121,118.94	291%	294%
Exterior 9-Watt LED	-	2,050.15	-	6,360.26	-	310%
R30 LED	3.477	21,682.58	9.126	66,604.57	262%	307%
Bathroom Aerator	0.485	5,319.42	0.509	5,341.82	105%	100%
Kitchen Aerator	12.732	7,709.94	0.355	7,768.34	3%	101%
Low-Flow Showerhead	38.424	79,854.53	3.919	80,041.16	10%	100%
Programmable Thermostat (Natural Gas Heat + Central AC)	-	683.84	-	683.84	-	100%
Smart Thermostat with Enrollment (Heat Pump)	-	141,481.57	-	159,008.46	-	112%
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	182,060.80	-	208,599.26	-	115%
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	80,418.59	-	77,201.85	-	96%
Smart Thermostat without Enrollment (Heat Pump)	-	1,413.15	-	1,673.56	-	118%
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	-	62.05	-	59.57	-	96%
Pipe Wrap	0.859	6,443.22	0.728	6,375.12	85%	99%
Water Heater Setback	0.444	3,895.14	0.377	3,304.24	85%	85%
Audit Recommendation	-	188,080.42	-	188,082.56	-	100%
Virtual Audit						
16-Watt LED	0.138	1,005.71	0.200	1,456.72	145%	145%
5-Watt LED Candelabra	1.200	8,758.13	1.049	7,653.55	87%	87%
5-Watt LED Globe	1.762	12,859.36	1.540	11,237.53	87%	87%
7-Watt LED Track Light	0.281	2,051.18	0.249	1,818.09	89%	89%
9-Watt LED	0.724	5,285.55	1.985	14,487.90	274%	274%
Exterior 9-Watt LED	-	1,105.87	-	980.27	-	89%
R30 LED	2.771	20,222.58	2.370	17,295.63	86%	86%
Bathroom Aerator	0.396	4,154.72	0.107	1,121.78	27%	27%
Kitchen Aerator	0.218	4,766.93	0.131	2,860.16	60%	60%
Low-Flow Showerhead	1.677	34,254.86	0.738	15,072.16	44%	44%
Smart Power Strip	1.485	8,250.00	1.173	6,517.50	79%	79%
Audit Recommendation	-	55,693.44	-	55,693.44	-	100%
Rebate Measures						
Central AC Tune-Up	27.836	11,376.63	22.033	10,974.05	79%	96%
Heat Pump Tune-Up	10.158	17,632.58	7.639	23,817.22	75%	135%
Heat Pump Water Heater	1.419	10,182.62	1.391	10,182.62	98%	100%
Central AC SEER 16	489.058	203,840.59	547.025	272,455.89	112%	134%
Central AC SEER 17	244.881	105,735.31	282.920	140,913.39	116%	133%
Central AC SEER 18+	121.148	54,463.76	129.845	64,671.83	107%	119%

Measure	*Ex Ante* Savings (With Embedded ISRs) [a]		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
Heat Pump SEER 16	132.346	205,577.98	161.356	195,726.89	122%	95%
Heat Pump SEER 17	112.373	202,814.53	117.206	140,508.36	104%	69%
Heat Pump SEER 18+	66.439	123,610.89	75.573	80,273.68	114%	65%
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	6.268	18,791.10	4.978	16,563.29	79%	88%
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	7.250	108,424.98	4.250	44,089.21	59%	41%
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	2.909	7,019.81	3.187	5,784.09	110%	82%
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	8.025	23,289.79	5.355	17,580.40	67%	75%
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	5.192	58,689.03	3.348	33,556.39	64%	57%
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	0.815	8,429.03	0.792	8,026.73	97%	95%
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	5.594	13,341.77	6.768	13,062.59	121%	98%
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	10.193	32,779.46	6.773	20,866.98	66%	64%
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	9.570	148,148.49	5.046	45,136.43	53%	30%
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	0.618	5,608.96	0.898	8,098.59	145%	144%
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	5.431	13,547.45	5.287	8,880.02	97%	66%
Weatherization Measures						
Air Sealing (Electric Heat + Central AC)	0.979	9,285.80	0.979	9,285.80	100%	100%
Air Sealing (Heat Pump)	0.442	5,174.13	0.442	5,174.13	100%	100%
Attic Insulation R-12 to R-49 (Heat Pump)	0.542	2,528.05	0.402	2,295.76	74%	91%
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	1.961	2,589.27	1.476	2,071.32	75%	80%
Attic Insulation R≤11 to R-49 (Heat Pump)	1.209	5,636.86	0.926	5,184.70	77%	92%
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	3.007	30,466.32	2.535	26,523.97	84%	87%
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	6.472	8,547.43	4.923	7,607.88	76%	89%
Duct Sealing (Heat Pump)	0.415	895.86	0.415	895.86	100%	100%
Duct Sealing (Electric Heat + Central AC)	0.251	1,287.71	0.251	1,287.71	100%	100%

Measure	*Ex Ante* Savings (With Embedded ISRs) [a]		*Ex Post* Gross Savings		Realization Rate	
	kW	kWh	kW	kWh	kW	kWh
2020 Kits Combined						
11-Watt LED	15.553	113,460.99	37.990	348,890.81	244%	307%
16-Watt LED	27.453	200,247.61	44.297	406,812.11	161%	203%
9-Watt LED	10.061	73,415.93	30.733	28,100.29	305%	38%
LED Night-Light	-	122,182.14	-	92,858.43	-	76%
Bathroom Aerator (Electric)	7.599	79,770.70	2.047	21,484.81	27%	27%
Bathroom Aerator (Non-Electric)	20.545	215,676.34	-	-	0%	0%
Kitchen Aerator (Electric)	5.052	110,640.47	3.002	65,748.76	59%	59%
Kitchen Aerator (Non-Electric)	13.660	299,139.04	-	-	0%	0%
Low-Flow Showerhead (Electric)	10.406	212,539.52	4.535	92,622.14	44%	44%
Low-Flow Showerhead (Non-Electric)	28.136	574,643.88	-	-	0%	0%
Smart Power Strip	79.704	442,800.00	62.966	349,812.00	79%	79%
Furnace Whistle (Central AC Only)	273.914	773,902.08	21.600	16,258.48	8%	2%
Furnace Whistle (Electric Cooling + Heat)	78.261	221,114.88	6.171	17,436.49	8%	8%
Furnace Whistle (Heating Only)	8.696	24,568.32	-	1,421.25	0%	6%
Furnace Whistle (Natural Gas Heat + No Central AC)	73.913	208,830.72	-	-	0%	0%
Whole Home - Direct Install Kit [b]	**130.519**	**496,537.19**	**32.047**	**260,544.217**	**25%**	**52%**
9-Watt LED	-	-	24.057	220,929.50	-	-
LED Night-Light	-	-	-	24,572.25	-	-
Bathroom Aerator (Electric)	-	-	0.535	5,615.32	-	-
Bathroom Aerator (Non-Electric)	-	-	-	-	-	-
Furnace Whistle (Central AC Only)	-	-	5.799	4,364.68	-	-
Furnace Whistle (Electric Cooling + Heat)	-	-	1.657	4,680.92	-	-
Furnace Whistle (Heating Only)	-	-	-	381.54	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	-	-	-	-
Total	**2,147**	**6,581,271**	**1,711**	**4,141,387**	**80%**	**63%**

Note: Values rounded for reporting purposes.

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] The overall kit *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Table 176 and Table 177 show program *ex ante* reported savings, audited savings, verified savings, and *ex post* gross demand reduction and energy savings, respectively.

Table 176. 2020 Whole Home Program *Ex Ante* and *Ex Post* Gross Peak Demand Reduction (kW)

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
In-Person Audit				
16-Watt LED	1.221	1.153	1.216	2.052
5-Watt LED Candelabra	1.831	1.821	1.840	7.970
5-Watt LED Globe	4.362	4.332	4.377	8.983
7-Watt LED Track Light	0.221	0.244	0.247	1.476
9-Watt LED	5.699	5.637	5.943	16.595
Exterior 9-Watt LED	-	-	-	-
R30 LED	3.477	3.390	3.426	9.126

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
Bathroom Aerator	0.485	0.486	0.486	0.509
Kitchen Aerator	12.732	3.049	3.049	0.355
Low-Flow Showerhead	38.424	21.287	21.287	3.919
Programmable Thermostat (Natural Gas Heat + Central AC)	-	-	-	-
Smart Thermostat with Enrollment (Heat Pump)	-	-	-	-
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	-	-	-
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	-	-	-
Smart Thermostat without Enrollment (Heat Pump)	-	-	-	-
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	-	-	-	-
Pipe Wrap	0.859	0.860	0.887	0.728
Water Heater Setback	0.444	0.444	0.688	0.377
Audit Recommendation	-	-	-	-
Virtual Audit				
16-Watt LED	0.138	0.140	0.109	0.200
5-Watt LED Candelabra	1.200	1.192	0.929	1.049
5-Watt LED Globe	1.762	1.750	1.365	1.540
7-Watt LED Track Light	0.281	0.282	0.220	0.249
9-Watt LED	0.724	0.710	0.553	1.985
Exterior 9-Watt LED	-	-	-	-
R30 LED	2.771	2.761	2.153	2.370
Bathroom Aerator	0.396	0.391	0.105	0.107
Kitchen Aerator	0.218	0.219	0.131	0.131
Low-Flow Showerhead	1.677	1.677	0.738	0.738
Smart Power Strip	1.485	1.485	1.173	1.173
Audit Recommendation	-	-	-	-
Rebate Measures				
Central AC Tune-Up	27.836	27.836	27.836	22.033
Heat Pump Tune-Up	10.158	10.159	10.159	7.639
Heat Pump Water Heater	1.419	1.419	1.419	1.391
Central AC SEER 16	489.058	489.058	489.058	547.025
Central AC SEER 17	244.881	244.884	244.884	282.920
Central AC SEER 18+	121.148	121.147	121.147	129.845
Heat Pump SEER 16	132.346	132.347	132.347	161.356
Heat Pump SEER 17	112.373	112.374	112.374	117.206
Heat Pump SEER 18+	66.439	66.439	66.439	75.573
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	6.268	6.268	6.268	4.978
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	7.250	7.250	7.250	4.250
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	2.909	2.909	2.909	3.187
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	8.025	8.025	8.025	5.355
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	5.192	5.192	5.192	3.348
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	0.815	0.815	0.815	0.792
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	5.594	5.594	5.594	6.768

Measure	*Ex Ante* Reduction [a]	Audited Reduction	Verified Reduction	*Ex Post* Gross Reduction
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	10.193	10.193	10.193	6.773
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	9.570	9.570	9.570	5.046
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	0.618	0.618	0.618	0.898
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	5.431	5.431	5.431	5.287
Weatherization Measures				
Air Sealing (Electric Heat + Central AC)	0.979	0.979	0.979	0.979
Air Sealing (Heat Pump)	0.442	0.442	0.442	0.442
Attic Insulation R-12 to R-49 (Heat Pump)	0.542	0.542	0.542	0.402
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	1.961	1.961	1.961	1.476
Attic Insulation R≤11 to R-49 (Heat Pump)	1.209	1.209	1.209	0.926
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	3.007	3.008	3.008	2.535
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	6.472	6.472	6.472	4.923
Duct Sealing (Heat Pump)	0.415	0.415	0.415	0.415
Duct Sealing (Electric Heat + Central AC)	0.251	0.251	0.251	0.251
2020 Kits Combined				
11-Watt LED	15.553	15.230	15.057	37.990
16-Watt LED	27.453	27.776	27.442	44.297
9-Watt LED	10.061	9.855	9.736	30.733
LED Night-Light	-	-	-	-
Bathroom Aerator (Electric)	7.599	7.500	2.020	2.047
Bathroom Aerator (Non-Electric)	20.545	20.276	-	-
Kitchen Aerator (Electric)	5.052	5.076	3.016	3.002
Kitchen Aerator (Non-Electric)	13.660	13.724	-	-
Low-Flow Showerhead (Electric)	10.406	10.403	4.533	4.535
Low-Flow Showerhead (Non-Electric)	28.136	28.126	-	-
Smart Power Strip	79.704	79.704	62.966	62.966
Furnace Whistle (Central AC Only)	273.914	273.773	21.600	21.600
Furnace Whistle (Electric Cooling + Heat)	78.261	78.221	6.171	6.171
Furnace Whistle (Heating Only)	8.696	8.691	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	73.913	73.875	-	-
Whole Home - Direct Install Kit [b]	**130.52**	**130.41**	**15.61**	**32.05**
9-Watt LED	-	-	7.621	24.057
LED Night-Light	-	-	-	-
Bathroom Aerator (Electric)	-	-	0.535	0.535
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC Only)	-	-	5.799	5.799
Furnace Whistle (Electric Cooling + Heat)	-	-	1.657	1.657
Furnace Whistle (Heating Only)	-	-	-	-
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	-	-
Total	**2,147**	**2,119**	**1,502**	**1,714**

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] The overall kit *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Table 177. 2020 Whole Home Program *Ex Ante* and *Ex Post* Gross Electric Energy Savings (kWh)

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
In-Person Audit				
16-Watt LED	8,914.31	8,463.00	8,922.95	14,975.55
5-Watt LED Candelabra	11,188.53	11,146.73	11,262.84	58,171.17
5-Watt LED Globe	29,658.26	29,617.20	29,925.71	65,561.18
7-Watt LED Track Light	1,613.83	1,671.40	1,688.81	10,774.87
9-Watt LED	41,146.42	39,587.68	41,739.18	121,118.94
Exterior 9-Watt LED	2,050.15	2,070.00	2,182.50	6,360.26
R30 LED	21,682.58	21,240.34	21,461.59	66,604.57
Bathroom Aerator	5,319.42	5,310.36	5,310.36	5,341.82
Kitchen Aerator	7,709.94	7,755.44	7,755.44	7,768.34
Low-Flow Showerhead	79,854.53	79,940.28	79,940.28	80,041.16
Programmable Thermostat (Natural Gas Heat + Central AC)	683.84	683.84	683.84	683.84
Smart Thermostat with Enrollment (Heat Pump)	141,481.57	141,480.85	135,821.62	159,008.46
Smart Thermostat with Enrollment (Electric Heat + Central AC)	182,060.80	182,060.46	174,778.04	208,599.26
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	80,418.59	80,420.83	77,204.00	77,201.85
Smart Thermostat without Enrollment (Heat Pump)	1,413.15	1,413.15	1,356.62	1,673.56
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	62.05	62.05	59.57	59.57
Pipe Wrap	6,443.22	6,443.22	7,676.81	6,375.12
Water Heater Setback	3,895.14	3,895.14	6,035.78	3,304.24
Audit Recommendation	188,080.42	188,082.56	188,082.56	188,082.56
Virtual Audit				
16-Watt LED	1,005.71	1,005.71	784.45	1,456.72
5-Watt LED Candelabra	8,758.13	8,758.13	6,831.34	7,653.55
5-Watt LED Globe	12,859.36	12,859.37	10,030.31	11,237.53
7-Watt LED Track Light	2,051.18	2,051.17	1,599.92	1,818.09
9-Watt LED	5,285.55	5,285.58	4,122.75	14,487.90
Exterior 9-Watt LED	1,105.87	1,105.87	862.58	980.27
R30 LED	20,222.58	20,222.57	15,773.61	17,295.63
Bathroom Aerator	4,154.72	4,154.72	1,121.78	1,121.78
Kitchen Aerator	4,766.93	4,766.93	2,860.16	2,860.16
Low-Flow Showerhead	34,254.86	34,254.86	15,072.14	15,072.16
Smart Power Strip	8,250.00	8,250.00	6,517.50	6,517.50
Audit Recommendation	55,693.44	55,693.44	55,693.44	55,693.44
Rebate Measures				
Central AC Tune-Up	11,376.63	11,376.63	11,376.63	10,974.05
Heat Pump Tune-Up	17,632.58	17,632.58	17,632.58	23,817.22
Heat Pump Water Heater	10,182.62	10,182.62	10,182.62	10,182.62
Central AC SEER 16	203,840.59	203,840.59	203,840.59	272,455.89
Central AC SEER 17	105,735.31	105,735.31	105,735.31	140,913.39
Central AC SEER 18+	54,463.76	54,463.76	54,463.76	64,671.83
Heat Pump SEER 16	205,577.98	205,577.98	205,577.98	195,726.89
Heat Pump SEER 17	202,814.53	202,814.53	202,814.53	140,508.36
Heat Pump SEER 18+	123,610.89	123,610.89	123,610.89	80,273.68

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	18,791.10	18,791.10	18,791.10	16,563.29
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	108,424.98	108,424.98	108,424.98	44,089.21
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	7,019.81	7,019.81	7,019.81	5,784.09
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	23,289.79	23,289.79	23,289.79	17,580.40
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	58,689.03	58,689.03	58,689.03	33,556.39
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	8,429.03	8,429.03	8,429.03	8,026.73
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	13,341.77	13,341.77	13,341.77	13,062.59
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	32,779.46	32,779.46	32,779.46	20,866.98
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	148,148.49	148,148.49	148,148.49	45,136.43
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	5,608.96	5,608.96	5,608.96	8,098.59
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	13,547.45	13,547.45	13,547.45	8,880.02
Weatherization Measures				
Air Sealing (Electric Heat + Central AC)	9,285.80	9,285.80	9,285.80	9,285.80
Air Sealing (Heat Pump)	5,174.13	5,174.13	5,174.13	5,174.13
Attic Insulation R-12 to R-49 (Heat Pump)	2,528.05	2,528.05	2,528.05	2,295.76
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	2,589.27	2,589.27	2,589.27	2,071.32
Attic Insulation R≤11 to R-49 (Heat Pump)	5,636.86	5,636.86	5,636.86	5,184.70
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	30,466.32	30,466.32	30,466.32	26,523.97
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	8,547.43	8,547.43	8,547.43	7,607.88
Duct Sealing (Heat Pump)	895.86	895.86	895.86	895.86
Duct Sealing (Electric Heat + Central AC)	1,287.71	1,287.71	1,287.71	1,287.71
2020 Kits Combined				
11-Watt LED	113,460.99	113,461.26	112,171.92	348,890.81
16-Watt LED	200,247.61	200,247.94	197,839.82	406,812.11
9-Watt LED	73,415.93	73,416.32	72,533.43	28,100.29
LED Night-Light	122,182.14	122,182.14	92,858.43	92,858.43
Bathroom Aerator (Electric)	79,770.70	79,770.70	21,484.67	21,484.81
Bathroom Aerator (Non-Electric)	215,676.34	215,676.34	-	-
Kitchen Aerator (Electric)	110,640.47	110,640.47	65,748.69	65,748.76
Kitchen Aerator (Non-Electric)	299,139.04	299,139.04	-	-
Low-Flow Showerhead (Electric)	212,539.52	212,539.52	92,622.01	92,622.14
Low-Flow Showerhead (Non-Electric)	574,643.88	574,643.88	-	-
Smart Power Strip	442,800.00	442,800.00	349,812.00	349,812.00
Furnace Whistle (Central AC Only)	773,902.08	773,902.08	16,258.48	16,258.48
Furnace Whistle (Electric Cooling + Heat)	221,114.88	221,114.88	17,436.49	17,436.49
Furnace Whistle (Heating Only)	24,568.32	24,568.32	1,421.25	1,421.25
Furnace Whistle (Natural Gas Heat + No Central AC)	208,830.72	208,830.72	-	-

Measure	*Ex Ante* Savings [a]	Audited Savings	Verified Savings	*Ex Post* Gross Savings
Whole Home - Direct Install Kit [b]	**496,537.19**	**496,537.19**	**96,390.57**	**260,544.22**
9-Watt LED	-	-	56,775.86	220,929.50
LED Night-Light	-	-	24,572.25	24,572.25
Bathroom Aerator (Electric)	-	-	5,615.32	5,615.32
Bathroom Aerator (Non-Electric)	-	-	-	-
Furnace Whistle (Central AC Only)	-	-	4,364.68	4,364.68
Furnace Whistle (Electric Cooling + Heat)	-	-	4,680.92	4,680.92
Furnace Whistle (Heating Only)	-	-	381.54	381.54
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	-	-
Total	**6,581,271**	**6,578,940**	**3,499,452**	**4,141,387**

[a] *Ex ante* savings are shown with the embedded ISRs.

[b] The overall kit *ex post* gross savings is a sum of the individual measures. This sum is not duplicated in the total *ex post* gross savings.

Ex Post Net Savings

The team determined NTG separately for rebated measures, kit measures, and direct install measures, each outlined below. Primarily, the NTG was estimated based on survey responses for individual measures. In instances where the evaluation team did not receive any responses for certain measures, the team applied a NTG estimate from the 2019 evaluation if primary data was collected. In select cases, a deemed NTG was applied. Measure-specific NTG estimates are in Table 194.

Rebated Measures Net-to-Gross

The evaluation team calculated NTG for rebated measures, employing survey data collected from 71 participants. As shown in Table 178, the team estimated a 69% NTG for measures rebated through the Whole Home program.

Table 178. 2020 Whole Home Program Rebated Measures Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Rebated Measures	31%	0%	69%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Freeridership

To determine freeridership, the evaluation team asked respondents whether, in the program's absence, they would have installed equipment at the same efficiency level, at the same time, and in the same amount. Based on survey feedback, the team calculated 31% overall freeridership for Whole Home program rebated measures, as shown in Table 179.

Table 179. 2020 Whole Home Program Rebated Measures Freeridership Results

Program Component	Responses (n)	Freeridership [a]
Rebated Measures	71	31%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The methodology uses two unique scores to calculate freeridership: *intention* freeridership and *influence* freeridership (described below). The evaluation team calculated the overall program freeridership by averaging these savings-weighted *intention* and *influence* freeridership scores.

Intention Freeridership

The evaluation team estimated *intention* freeridership for each participant based on their responses to the *intention*-focused freeridership questions. As shown in Table 180, the Whole Home program rebated measures had an *intention* freeridership score of 48%.

Table 180. 2020 Whole Home Program Rebated Measures *Intention* Freeridership Results

Program Component	Responses (n)	*Intention* Freeridership [a]
Rebated Measures	71	48%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Table 181 shows the unique Whole Home program participant response combinations to the *intention* freeridership questions, along with the *intention* freeridership scores assigned to each combination and the number of responses for each combination. An "x" indicates a skipped question (depending on the participant's response to a previous question). The table's "Yes," "Partial," and "No" values represent whether the respondent's answer to a given question indicated freeridership.

Table 181. 2020 Whole Home Program Rebated Measures Frequency of *Intention* Freeridership Scoring Combinations

1 Already planning to purchase?	2. Already ordered or installed?	3. Confirm, installed before learning about program?	4. Installed same measure without incentive?	5. Installed anything at all without audit and rebate?	6. Installed same efficiency?	7. Installed same quantity or more?	8. Installed within one year?	Freeridership score	Response frequency
Yes	Yes	Yes	x	x	x	x	x	100%	17
Yes	Yes	No	Yes	x	Partial	x	No	0%	1
Yes	No	x	Yes	x	Yes	x	Yes	100%	13
Yes	No	x	Yes	x	Yes	x	Partial	75%	6
Yes	No	x	Yes	x	Partial	x	Yes	75%	1
Yes	No	x	Partial	Yes	No	x	x	0%	1
Yes	No	x	Partial	Partial	x	x	x	75%	6
Yes	No	x	No	Yes	No	x	x	0%	1
Yes	No	x	No	Partial	x	x	x	50%	3
Partial	X	x	Yes	x	Partial	x	Partial	25%	1
Partial	X	x	Partial	Partial	x	x	x	50%	2
Partial	X	x	No	Yes	No	x	x	0%	1
Partial	X	x	No	Partial	x	x	x	25%	1
No	X	x	Yes	x	Yes	x	Yes	50%	4
No	X	x	Yes	x	No	x	x	0%	1
No	X	x	Partial	Yes	Yes	x	Partial	25%	2
No	X	x	Partial	Yes	Partial	x	Yes	25%	1
No	X	x	Partial	Partial	x	x	x	25%	4
No	X	x	Partial	No	x	x	x	0%	1
No	X	x	No	Yes	Yes	x	Yes	25%	1
No	X	x	No	Yes	No	x	x	0%	1
No	X	x	No	Partial	x	x	x	12.5%	1
No	X	x	No	No	x	x	x	0%	1

Influence Freeridership

The evaluation team assessed *influence* freeridership by asking rebate measure participants how important various program elements were in their purchasing decision-making process. Table 182 shows program elements that participants rated for importance, along with the number of responses and average rating for each factor. Of all areas, program information from the technician and the rebate were most influential in participants' decisions.

Table 182. 2020 Whole Home Program Rebated Measures *Influence* Freeridership Responses

Influence Rating	*Influence* Score	Program Information from Technician	IPL Equipment Rebate	Information from Home Energy Assessment	Energy Efficiency Information from IPL	Previous IPL Energy Efficiency Program Participant
1 - Not at all important	100%	6	3	2	6	7
2	75%	4	6	4	11	12
3	25%	21	29	1	19	7
4 - Very important	0%	33	28	3	26	13
Not applicable	50%	6	3	3	8	29
Average Rating		**3.3**	**3.2**	**2.5**	**3.0**	**2.7**

The team determined each respondent's *influence* freeridership score for each measure category using the maximum rating provided for any factor included in Table 182. As shown in Table 183, the respondents' maximum *influence* ratings ranged from 1 (*not at all important*) to 4 (*very important*). A maximum score of 1 meant the customer ranked all factors from the table as *not at all important*, while a maximum score of 4 meant the customer ranked at least one factor as *very important*. Counts refer to the number of "maximum *influence*" responses for each factor/*influence* score response option.

Table 183. 2020 Whole Home Program Rebated Measures *Influence* Freeridership Score

Maximum *Influence* Rating	*Influence* Score	Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)
1 - Not at all important	100%	1	442	442
2	75%	3	2,617	1,963
3	25%	19	13,560	3,390
4 - Very important	0%	45	31,504	0
Not applicable	50%	3	1,971	986
Average Maximum *Influence* Rating (Simple Average)		**3.6**		
Average *Influence* Score (Weighted by *Ex Post* Savings)				**14%**

Final Freeridership

The evaluation team calculated the mean of the *intention* and *influence* components of freeridership to estimate the final freeridership of 31% for rebated measures:

$$Final\ Freeridership\ (31\%) = \frac{Intention\ FR\ Score\ (48\%) + Influence\ FR\ Score\ (14\%)}{2}$$

A higher freeridership score translates to more savings being deducted from the gross savings estimates. Table 184 presents the *intention*, *influence*, and final freeridership scores for the rebated measures.

Table 184. 2020 Whole Home Program Rebated Measures Freeridership Score

Program Component	Responses (n)	*Intention* Score	*Influence* Score	Freeridership Score
Rebated Measures	71	48%	14%	31%

Spillover

The evaluation team did not ask survey questions to calculate spillover. The program claims savings for audit recommendations, which include spillover-related savings. Including spillover would therefore double count savings that are already being claimed by the audit recommendation in the gross savings analysis.

Net-to-Gross Summary

Table 185 shows the percentage of freeridership, spillover, and NTG for the Whole Home program rebated measures. The team used an equation to calculate NTG:

$$Program\ NTG = 100\% - Freeridership + Participant\ Spillover$$

Table 185. 2020 Whole Home Program Rebated Measures Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Rebated Measures	31%	0%	69%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Kit Measures Net-to-Gross

Using 224 measure-specific responses from 112 respondents to the 2020 participant survey, the evaluation team estimated NTG for the kit measures. General purpose LEDs had the highest freeridership score, while bathroom faucet aerators and furnace whistles had the lowest. Table 186 shows freeridership, spillover, and NTG adjustments for each kit measure.

Table 186. 2020 Whole Home Program Kit Measures Net-to-Gross Summary

Kit Measure	Responses (n)	Freeridership [a]	Spillover	NTG
LED	87	34%	0%	66%
LED Night-Light	96	8%	0%	92%
Bathroom Faucet Aerator	33	0%	0%	100%
Furnace Whistle	8	0%	0%	100%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Freeridership

To determine freeridership, the evaluation team asked participants representing 224 measure-specific freeridership responses about whether, in absence of the Whole Home program, they would have installed items to the same efficiency level within one year. Table 187 shows the freeridership results by kit measure.

Table 187. 2020 Whole Home Program Kit Measures Freeridership Results

Kit Measure	Responses (n)	Freeridership [a]
LED	87	34%
LED Night-Light	96	8%
Bathroom Faucet Aerator	33	0%
Furnace Whistle	8	0%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The evaluation team estimated measure-level freeridership for each participant based on responses to two questions:

- FR1. "Would you have purchased and installed any of the same energy efficiency kit items if you had not received them in your kit from IPL?"
- FR2. "When you would most likely have purchased and installed each kit item?"

If a participant answered "No" to FR1, they were estimated as a 0% freerider. If a participant answered "Yes" to FR1, the team estimated freeridership based on their answer to FR2. Table 188 shows response options to the freeridership questions, the freeridership score (FR Score) associated with each response, and the response frequency for each measure type.

Table 188. 2020 Whole Home Program Kit Measures Freeridership Responses and Scoring

Freeridership Questions and Response Options	FR Score	Frequency of Responses			
FR1. Would you have purchased and installed any of the same energy efficiency kit items if you had not received them in your kit from IPL?		LEDs	LED Night-Light	Bathroom Faucet Aerator	Furnace Whistle
No	0%	37	82	33	8
Yes					
FR2. When you would most likely have purchased and installed each kit item?					
At the same time I received the kit	100%	15	5	0	0
Later, but within one year	50%	32	6	0	0
More than one year later	0%	3	3	0	0
Never	0%	0	0	0	0
(Don't know)	25%	0	0	0	0
Total	**N/A**	**87**	**96**	**33**	**8**

Spillover

The evaluation team did not assess spillover for kit recipients for several reasons. First, doing so could double count savings claimed by the audit recommendation (which already captures spillover-related savings) if the customer also received an audit. Second, the kit alone is not designed to encourage higher saving measure adoption outside of IPL programs; therefore, there would be considerable uncertainty as to the validity of any spillover-related savings.

Net-to-Gross Summary

Table 189 shows the percentage of freeridership, spillover, and NTG for the Whole Home program kit measures. The team used an equation to calculate NTG:

$$Program\ NTG\ = 100\% - Freeridership + \ Participant\ Spillover$$

Table 189. 2020 Whole Homes Program Kit Measures Net-to-Gross Summary

Measure	Freeridership [a]	Spillover	NTG
LED	34%	0%	66%
LED Night-Light	8%	0%	92%
Bathroom Faucet Aerator	0%	0%	100%
Furnace Whistle	0%	0%	100%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Direct Install Measures Net-to-Gross

Using 62 measure-specific responses from 42 respondents to the 2020 participant survey, the evaluation team estimated NTG for measures that were directly installed during the audit. Table 190 shows freeridership, spillover, and NTG for each measure.

Note that the samples for most measures are very low (all under 30, and some with fewer than 10). The results for these measures should be reviewed with caution, as they are well outside the target of 90% confidence and ±10% precision. No program-related decisions should be made based on the NTG results associated with these measures.

Table 190. 2020 Whole Home Program Direct Install Measures Net-to-Gross Summary

Measure	Responses (n)	Freeridership [a]	Spillover	NTG
LEDs	25	10%	0%	90%
Smart Strip	7	17%	0%	83%
Smart Thermostat	23	15%	0%	85%
Showerhead	3	0%	0%	100%
Kitchen Faucet Aerator	2	0%	0%	100%
Bathroom Faucet Aerator	2	0%	0%	100%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Freeridership

To determine freeridership, the evaluation team asked participants representing 62 measure-specific freeridership responses about whether, in absence of the Whole Home program, they would have installed items to the same efficiency level within one year. Table 191 shows the freeridership results by direct install measure. For LEDs, the large variation in number of bulbs installed and freeridership associated with those customers (in some cases 0%) drove the LED freeridership results.

Table 191. 2020 Whole Home Program Direct Install Measures Freeridership Results

Kit Measure	Responses (n)	Freeridership [a]
LED	25	10%
Smart Strip	7	17%
Smart Thermostat	23	15%
Showerhead	3	0%
Kitchen Faucet Aerator	2	0%
Bathroom Faucet Aerator	2	0%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The evaluation team estimated measure-level freeridership for each participant based on their responses to two questions:

- FR1. "Would you have purchased and installed any of the energy-efficient items the technician installed in your home if you had not received them during the Home Energy Assessment?"
- FR2. "Thinking about timing, without the Home Energy Assessment from IPL, when you would most likely have purchased and installed each energy-efficient item?"

If a participant answered "No" to FR1, they were estimated as a 0% freerider. If a participant answered "Yes" to FR1, the team estimated freeridership based on their answer to FR2. Table 192 shows response options to the freeridership questions, the freeridership score (FR Score) associated with each response, and the response frequency for each measure type.

Table 192. 2020 Whole Home Program Direct Install Measures Freeridership Responses and Scoring

Freeridership Questions and Response Options	FR Score	Frequency of Responses [a]					
FR1. Would you have purchased and installed any of the energy-efficient items the technician installed?		LED	SS	ST	SH	KA	BA
No	0%	8	4	16	3	2	2
Yes							
FR2. When you would most likely have purchased and installed each energy-efficient item?							
Same time as Home Energy Assessment	100%	2	0	2	0	0	0
Later, but within one year	50%	11	1	3	0	0	0
More than one year later	0%	4	2	2	0	0	0
Never	0%	0	0	0	0	0	0
Total	**N/A**	**25**	**7**	**23**	**3**	**2**	**2**

SS = smart strip, ST = smart thermostat, PT = programmable thermostat, SH = showerhead, KA = kitchen faucet aerator, BA = bathroom faucet aerator

Spillover

The evaluation team did not ask survey questions to calculate spillover. The program claims savings for audit recommendations, which include spillover-related savings. Including spillover would therefore double count savings that are already being claimed for the audit recommendation in the gross savings analysis.

Net-to-Gross Summary

Table 193 shows the percentage of freeridership, spillover, and NTG for the Whole Home program direct install measures. The team used an equation to calculate NTG:

$$Program\ NTG = 100\% - Freeridership + Participant\ Spillover$$

Table 193. 2020 Whole Home Program Direct Install Measures Net-to-Gross Summary

Measure	Freeridership [a]	Spillover	NTG
LEDs	10%	0%	90%
Smart Strip	17%	0%	83%
Smart Thermostat	15%	0%	85%
Showerhead	0%	0%	100%
Kitchen Faucet Aerator	0%	0%	100%
Bathroom Faucet Aerator	0%	0%	100%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Evaluated Net Savings Adjustments

Table 194 shows the resulting *ex post* net energy savings and demand reduction for 2020. The program contributed 3,276,956 kWh in net energy savings and 1,226 kW in net demand reduction (including carryover savings). Approximately 79% of the *ex post* savings are attributable to the program (calculated as total *ex post* net savings divided by *ex post* gross savings).

Table 194. 2020 Whole Home Program *Ex Post* Gross and Net Savings and Reduction

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
In-Person Audit					
16-Watt LED	2.052	14,975.55	90%	1.847	13,478.00
5-Watt LED Candelabra	7.970	58,171.17	90%	7.173	52,354.05
5-Watt LED Globe	8.983	65,561.18	90%	8.085	59,005.06
7-Watt LED Track Light	1.476	10,774.87	90%	1.329	9,697.39
9-Watt LED	16.595	121,118.94	90%	14.936	109,007.04
Exterior 9-Watt LED	-	6,360.26	90%	0.000	5,724.23
R30 LED	9.126	66,604.57	90%	8.213	59,944.11
Bathroom Aerator	0.509	5,341.82	100%	0.509	5,341.82
Kitchen Aerator	0.355	7,768.34	100%	0.355	7,768.34
Low-Flow Showerhead	3.919	80,041.16	100%	3.919	80,041.16
Programmable Thermostat (Natural Gas Heat + Central AC) [a]	-	683.84	100%	0.000	683.84
Smart Thermostat with Enrollment (Heat Pump)	-	159,008.46	85%	0.000	135,157.19
Smart Thermostat with Enrollment (Electric Heat + Central AC)	-	208,599.26	85%	0.000	177,309.37
Smart Thermostat with Enrollment (Natural Gas Heat + Central AC)	-	77,201.85	85%	0.000	65,621.57

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
Smart Thermostat without Enrollment (Heat Pump)	-	1,673.56	85%	0.000	1,422.52
Smart Thermostat without Enrollment (Natural Gas Heat + Central AC)	-	59.57	85%	0.000	50.63
Pipe Wrap [b]	0.728	6,375.12	100%	0.728	6,375.12
Water Heater Setback [b]	0.377	3,304.24	100%	0.377	3,304.24
Audit Recommendation [b]	-	188,082.56	100%	0.000	188,082.56
Virtual Audit					
16-Watt LED	0.200	1,456.72	90%	0.180	1,311.05
5-Watt LED Candelabra	1.049	7,653.55	90%	0.944	6,888.19
5-Watt LED Globe	1.540	11,237.53	90%	1.386	10,113.78
7-Watt LED Track Light	0.249	1,818.09	90%	0.224	1,636.28
9-Watt LED	1.985	14,487.90	90%	1.787	13,039.11
Exterior 9-Watt LED	-	980.27	90%	0.000	882.24
R30 LED	2.370	17,295.63	90%	2.133	15,566.07
Bathroom Aerator	0.107	1,121.78	100%	0.107	1,121.78
Kitchen Aerator	0.131	2,860.16	100%	0.131	2,860.16
Low-Flow Showerhead	0.738	15,072.16	100%	0.738	15,072.16
Smart Power Strip	1.173	6,517.50	83%	0.974	5,409.53
Audit Recommendation [b]	-	55,693.44	100%	0.000	55,693.44
Rebate Measures					
Central AC Tune-Up [a]	22.033	10,974.05	100%	22.033	10,974.05
Heat Pump Tune-Up [a]	7.639	23,817.22	100%	7.639	23,817.22
Heat Pump Water Heater [a]	1.391	10,182.62	100%	1.391	10,182.62
Central AC SEER 16	547.025	272,455.89	69%	377.447	187,994.57
Central AC SEER 17	282.920	140,913.39	69%	195.215	97,230.24
Central AC SEER 18+	129.845	64,671.83	69%	89.593	44,623.56
Heat Pump SEER 16	161.356	195,726.89	69%	111.335	135,051.56
Heat Pump SEER 17	117.206	140,508.36	69%	80.872	96,950.77
Heat Pump SEER 18+	75.573	80,273.68	69%	52.145	55,388.84
Mini-Split Heat Pump SEER 19 (Replacing Heat Pump)	4.978	16,563.29	69%	3.435	11,428.67
Mini-Split Heat Pump SEER 19 (Replacing Electric Furnace)	4.250	44,089.21	69%	2.933	30,421.56
Mini-Split Heat Pump SEER 19 (Replacing Room AC)	3.187	5,784.09	69%	2.199	3,991.02
Mini-Split Heat Pump SEER 21 (Replacing Heat Pump)	5.355	17,580.40	69%	3.695	12,130.47
Mini-Split Heat Pump SEER 21 (Replacing Electric Furnace)	3.348	33,556.39	69%	2.310	23,153.91
Mini-Split Heat Pump SEER 21 (Replacing Electric Baseboard)	0.792	8,026.73	69%	0.546	5,538.44
Mini-Split Heat Pump SEER 21 (Replacing Room AC)	6.768	13,062.59	69%	4.670	9,013.19
Mini-Split Heat Pump SEER 23+ (Replacing Heat Pump)	6.773	20,866.98	69%	4.674	14,398.22
Mini-Split Heat Pump SEER 23+ (Replacing Electric Furnace)	5.046	45,136.43	69%	3.482	31,144.14
Mini-Split Heat Pump SEER 23+ (Replacing Electric Baseboard)	0.898	8,098.59	69%	0.619	5,588.03
Mini-Split Heat Pump SEER 23+ (Replacing Room AC)	5.287	8,880.02	69%	3.648	6,127.22

Measure	*Ex Post* Gross Savings		NTG	*Ex Post* Net Savings	
	kW	kWh		kW	kWh
Weatherization Measures [c]					
Air Sealing (Electric Heat + Central AC)	0.979	9,285.80	100%	0.979	9,285.80
Air Sealing (Heat Pump)	0.442	5,174.13	100%	0.442	5,174.13
Attic Insulation R-12 to R-49 (Heat Pump)	0.402	2,295.76	100%	0.402	2,295.76
Attic Insulation R-12 to R-49 (Natural Gas Heat + Central AC)	1.476	2,071.32	100%	1.476	2,071.32
Attic Insulation R≤11 to R-49 (Heat Pump)	0.926	5,184.70	100%	0.926	5,184.70
Attic Insulation R≤11 to R-49 (Electric Heat + Central AC)	2.535	26,523.97	100%	2.535	26,523.97
Attic Insulation R≤11 to R-49 (Natural Gas Heat + Central AC)	4.923	7,607.88	100%	4.923	7,607.88
Duct Sealing (Heat Pump)	0.415	895.86	100%	0.415	895.86
Duct Sealing (Electric Heat + Central AC)	0.251	1,287.71	100%	0.251	1,287.71
2020 Kits Combined					
11-Watt LED	37.990	348,890.81	66%	25.074	230,267.94
16-Watt LED	44.297	406,812.11	66%	29.236	268,496.00
9-Watt LED	30.733	28,100.29	66%	20.284	18,546.19
LED Night-Light	-	92,858.43	92%	0.000	85,429.76
Bathroom Aerator (Electric)	2.047	21,484.81	100%	2.047	21,484.81
Bathroom Aerator (Non-Electric)	-	-	100%	0.000	0.00
Kitchen Aerator (Electric)	3.002	65,748.76	100%	3.002	65,748.76
Kitchen Aerator (Non-Electric)	-	-	100%	0.000	0.00
Low-Flow Showerhead (Electric)	4.535	92,622.14	100%	4.535	92,622.14
Low-Flow Showerhead (Non-Electric)	-	-	100%	0.000	0.00
Smart Power Strip	62.966	349,812.00	83%	52.262	290,343.96
Furnace Whistle (Central AC Only)	21.600	16,258.48	100%	21.600	16,258.48
Furnace Whistle (Electric Cooling + Heat)	6.171	17,436.49	100%	6.171	17,436.49
Furnace Whistle (Heating Only)	-	1,421.25	100%	0.000	1,421.25
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	100%	0.000	0.00
Whole Home - Direct Install Kit					
9-Watt LED	24.057	220,929.50	66%	15.877	145,813.47
LED Night-Light	-	24,572.25	92%	0.000	22,606.47
Bathroom Aerator (Electric)	0.535	5,615.32	100%	0.535	5,615.32
Bathroom Aerator (Non-Electric)	-	-	100%	0.000	0.00
Furnace Whistle (Central AC Only)	5.799	4,364.68	100%	5.799	4,364.68
Furnace Whistle (Electric Cooling + Heat)	1.657	4,680.92	100%	1.657	4,680.92
Furnace Whistle (Heating Only)	-	381.54	100%	0.000	381.54
Furnace Whistle (Natural Gas Heat + No Central AC)	-	-	100%	0.000	0.00
Total	**1,711**	**4,141,387**		**1,226**	**3,276,956**

[a] No programmable thermostat participants responded to the 2020 survey. 2019 programmable thermostat NTG estimate of 100% applied.

[b] 100% deemed NTG applied.

[c] No surveys were completed with respondents and a 100% deemed NTG was applied.

Process Evaluation

For the process evaluation, the evaluation team interviewed IPL, reviewed program tracking data, and surveyed program participants.

Changes to Program Design

IPL made several program design changes during 2020, including both planned changes and changes due to the COVID-19 pandemic:

- ***Addition of three kit options.*** IPL launched three new kits in March 2020 to provide customers with a more robust offering and different choices. This was originally part of the 2020 plan and corresponded with the same kit options offered during 2020 through the IQW program.
- ***Addition of a virtual assessment option.*** IPL was already planning to offer virtual assessments for the 2021 program. In March 2020, IPL ceased in-home assessments and all in-home activities due to COVID-19, and launched virtual assessments as a formal program offering in June 2020. This also aligns with the virtual assessment option provided through the IQW program.
- ***Addition of custom kits.*** IPL added custom kits to the program, corresponding with the launch of virtual assessments in June 2020, to replace the typical direct install measures previously installed by the CLEAResult technician during the in-home assessment. During the virtual assessment, the technician notes what measures the home could use and what measures they already received in their initial kit, then creates and mails a custom kit to the customer for self-install.
- ***Addition of direct ship smart thermostats.*** In June 2020, through the Demand Response program, IPL began shipping smart thermostats to Whole Home program participants. Program staff reported that savings for these measures are not claimed through the Demand Response program, but instead through the Whole Home program, where applicable.

2020 Program Highlights

IPL and CLEAResult reported several highlights from the 2020 program year:

- ***Concerted direct mail promotions and advertising.*** Understanding that customers may be burnt out on emails, IPL and CLEAResult promoted the new virtual offerings via direct mail. Program staff reported that they achieved 1,200 bookings from postcards and emails in total. CLEAResult also conducted a call campaign. Staff reported that the highest performing marketing channel was the call campaign, followed by the postcard and online and digital ads.
- ***Virtual assessment successes.*** Since IPL was already planning to offer virtual assessments in 2021, it was able to speed up the implementation and begin this offering in June 2020. The survey results demonstrate high customer satisfaction with the virtual assessment offering.
- ***Kit promotions.*** During the COVID-19 shutdown, IPL and CLEAResult continued to promote kits online and diversified the types of kits available to customers.
- ***Reach-back marketing campaign.*** Once they had launched the virtual assessments, IPL and CLEAResult conducted a reach-back marketing campaign to customers who had previously expressed interest in an in-home assessment. CLEAResult worked with and encouraged these customers to take advantage of the virtual assessment offering in place of an in-home assessment.

- ***Contractor network growth.*** The contractor network grew in 2020 to almost 80 total contractors. Program staff added additional support for contractors, including marketing pieces for them to use, contractor newsletters, and direct engagement with the program team. IPL also plans to offer virtual contractor webinars beginning in early 2021.
- ***HVAC rebate success.*** Program staff reported that 2020 was their best year for HVAC rebates. The AC tune-up measure overperformed and 76 contractors signed up to promote HVAC rebates to customers.

2020 Program Challenges

IPL and CLEAResult also noted 2020 program challenges, some of which they are already addressing as part of the 2021 program implementation:

- ***Cancellations.*** When the virtual assessments initially launched, there was an uptick in cancellations and no-shows for those assessments. IPL discovered that many people did not actually understand that the process would be *virtual*, and thought that program staff would be coming to their home, which they did not want during the COVID-19 pandemic. By adjusting customer messaging, the cancellations tapered down.
- ***Virtual assessment visit preparations.*** Customers needed to prepare several things in advance of their virtual assessment, such as fully charging their phone battery and having a flashlight and screwdriver handy, which was challenging to accomplish. Although CLEAResult communicates these preparatory items to the customer prior to their assessment, it can still be difficult to ensure that customers are fully prepared with the items needed to successfully complete the virtual assessment. In addition, it may be difficult for some customers to virtually show the technician spaces in their home that are difficult to access, such as the attic.
- ***Smart thermostat installation.*** IPL drop-shipped thermostats in coordination with the Demand Response program. However, program staff reported challenges related to customers being able to install these devices on their own, despite the manufacturer marketing them as an easy do-it-yourself process. To address this specific challenge, CLEAResult started helping customers to install their smart thermostat during the virtual assessment.

Planning for 2021

IPL will not offer the Whole Home program in 2021. Instead, it is rolling this program into a new Efficient Products program and program staff report that the kits and virtual assessments will be offered as part of that. In addition, customers who would have been eligible for the previous Whole Home phase II program rebated measures will be able to access rebates through the Efficient Products program. To help improve cost-effectiveness, IPL will no longer offer in-home assessments, but will continue to offer virtual assessments.

Participant Feedback

As part of the Whole Home program participant survey, the evaluation team asked limited satisfaction questions related to the in-home and virtual assessments, in an attempt to discern any key satisfaction differences in assessment delivery mode.

Program Satisfaction

Overall, 89% of program participants reported that they were very satisfied or somewhat satisfied with the Whole Home program overall.

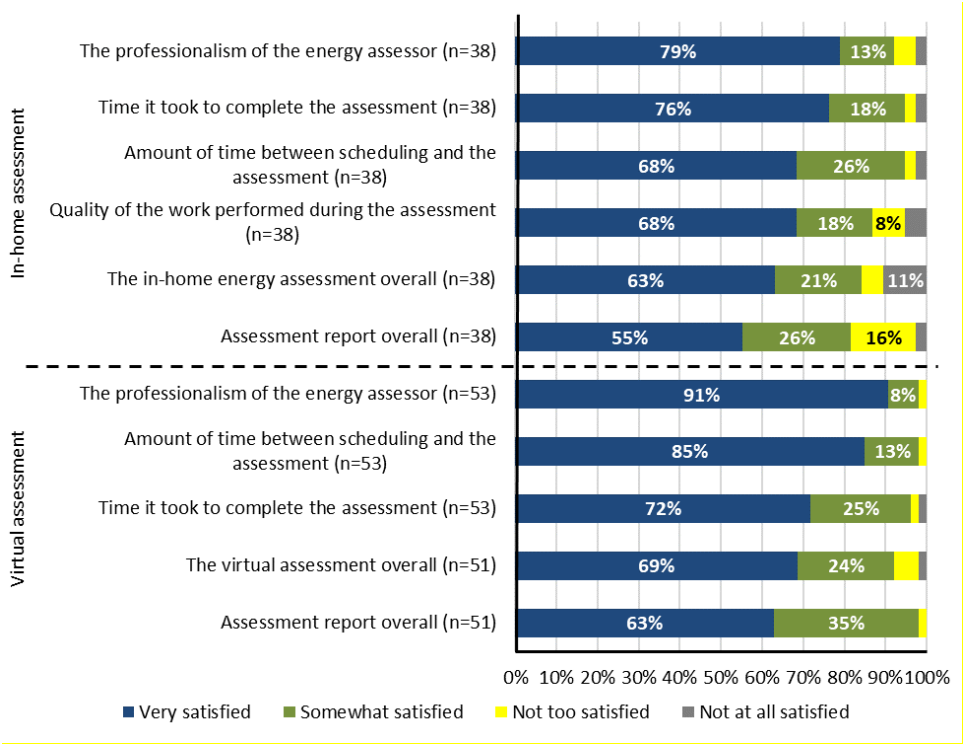
In addition, as part of the Whole Home program participant survey, the evaluation team asked limited satisfaction questions related to the in-home and virtual assessments, in an attempt to discern any key satisfaction differences in assessment delivery mode. Satisfaction with several components of the in-home and virtual assessments were relatively high, and two components had similar average ratings across in-home versus virtual assessment participants:

- ***Time it took to complete the energy assessment,*** with 76% of in-home and 72% of virtual assessment participants expressing high satisfaction ratings.
- ***Energy assessment overall,*** with 63% of in-home and 69% of virtual assessment participants expressing high satisfaction ratings.

As shown in Figure 60, there were also two components where satisfaction differences existed between in-home and virtual assessment participants:

- ***Professionalism of the CLEAResult technician,*** with 91% of virtual and 79% of in-home assessment participants expressing high satisfaction (both are high satisfaction levels overall).
- ***Amount of time between scheduling and the assessment,*** with 85% of virtual and 68% of in-home assessment participants expressing high satisfaction.

Figure 60. Participant Satisfaction with In-Home and Virtual Assessments



Source: 2020 IPL Whole Home Program Participant Survey Question: "How satisfied were you with each of the following aspects of the virtual/in-home assessment?"

Demographics

Table 195 details the demographic characteristics for all Whole Home program survey respondents.

Table 195. 2020 Whole Home Program Kit-Only, Audit, and Rebate-Only Respondent Demographics

Demographics	Kit-Only Respondents (n=90)	Audit Respondents (n=97)	Rebate-Only Respondents (n=69)
Homeownership Status			
Own	90%	96%	100%
Rent	9%	3%	0%
Other	1%	1%	0%
Type of Residence			
Single-family detached	86%	93%	90%
Multifamily apartment or condo (four or more units)	5%	3%	1%
Attached house (townhouse, rowhouse)	3%	3%	7%
Other	5%	0%	1%
Number of People in Home			
One	25%	29%	24%
Two	49%	45%	53%
Three	13%	10%	10%
Four	9%	11%	7%
Five or more	4%	5%	6%
Annual Household Income			
Under $25,000	4%	2%	7%
$25,000 to under $35,000	4%	3%	3%
$35,000 to under $50,000	12%	13%	4%
$50,000 to under $75,000	22%	19%	16%
$75,000 to under $100,000	13%	13%	9%
$100,000 to under $150,000	13%	16%	20%
Over $150,000	9%	8%	10%
Prefer not to say	22%	25%	30%

Follow-Up on 2019 Evaluation Recommendations

The evaluation team reviewed the 2020 program files to follow up on the recommendations made during the 2019 evaluation; the status of each is shown in Table 196.

Table 196. Whole Home Program 2019 Recommendation Status

2019 Recommendation	Status
Use the updated *ex post* values for deemed savings values going forward. The team referenced the Indiana TRM (v2.2), the UMP, and—most importantly—actual participation data (where available) to inform variable inputs within calculations.	***Completed.*** CLEAResult incorporated *ex post* values based on 2019 evaluation results.
Clearly document the correct per-unit deemed savings values across all sources and update this document as any changes are made. Savings values varied between the documentation and participation data, making it unclear which savings values to reference.	***Completed.*** CLEAResult documents these details in measure savings protocol templates.

2019 Recommendation	Status
From an evaluability perspective, consistently apply ISRs to per-unit measure assumptions. Use the updated *ex post* savings values and apply the per-measure ISRs developed in this 2019 evaluation for the next program cycle. For all measures and kit components, use an ISR of 1.0 to calculate ex ante savings so there is a consistent approach between *ex ante* and *ex post* gross savings evaluation methods.	***Completed.*** CLEAResult updated kit ISRs in September 2020 and included a year-to-date reconciliation of savings values.
Develop a methodology to track kit recipient's heating and cooling system and water heating fuel types, as well as other relevant measure metrics. Update *ex ante* savings assumptions to match the evaluation *ex post* assumptions.	***Not completed.*** CLEAResult does not currently track these details for kits.
For the 2020 evaluation, investigate how the assessment report may be more useful for customers or could be modified to improve their satisfaction in general by including open-ended survey questions specific to the assessment report. Additionally, obtain informal feedback through discussions with the technician, who may be able to provide insight based on follow-up interactions with customers after the assessment. Finally, consider having the evaluation team conduct usability and readability assessments with program participants. All these approaches would provide qualitative, in-depth insight that could inform the satisfaction ratings and opportunities for improvement.	***In progress.*** For 2021, CLEAResult is revising the assessment report to remove the eScore and will continue refining the report based on customer recommendations, as part of the continued virtual assessment offering. This was not completed in 2020, and as such, the evaluation team does not have insight into whether the customers are more satisfied with the assessment report.
Establish target conversion rate metrics. Track and report on those conversion rates each year to measure progress against the target metrics and to identify process improvements that will enable IPL to continue to support these goals.	***Not completed.*** The halting of field work has stalled efforts to provide this reporting. Given the significant program design changes for 2021 and beyond, CLEAResult will continue to evaluate the ability to track participation uptake against recommendations made during virtual and in-home assessments.

Conclusions and Recommendations

CONCLUSION 1: The Whole Home program achieved approximately half its energy-savings, in large part due to the COVID-19 pandemic, which prevented any in-person activities from March through December 2020.

For 2020, the Whole Home program achieved 3,726,956 kWh of *ex post* net energy savings and 1,226 kW of *ex post* net demand reduction, achieving 51% of the energy-savings goal and 90% of the demand reduction goal. The 2020 energy-savings is lower than in 2019, when IPL achieved 64% of its energy-savings goal. This decrease is likely the result of the COVID-19 pandemic, which prevented CLEAResult from administering in-person program components that typically provide the majority of overall savings.

CONCLUSION 2: Both the energy-savings and demand reduction realization rates were lower than 100%. The energy-savings realization rate decreased from 2019 while the demand reduction realization rate increased from 2019, achieving 63% for energy savings and 80% for demand reduction in 2020. In large part, these changes are because the COVID-19 pandemic impacted CLEAResult's ability to safely deliver the core program offerings (in-person audits with direct install measures and the opportunity for add-on measures) and forced IPL to rely more on energy-saving kits, which typically have more adjustments due to inconsistent or incomplete data collection.

The overall program realization rates were lower than 100% because of *ex post* savings adjustments the evaluation team made to the kit components. These adjustments are consistent with the approach we used in both the 2018 and 2019 evaluations:

- ***HVAC system information was not tracked for customers who received furnace whistles.*** The team applied different *ex post* savings values to furnace whistles to reflect the fuel types of participant's cooling and heating systems. The evaluation team assigned demand reduction only to the portion of customers with central AC.
- ***Water heating fuel was not tracked for customers who received water savings measures in their energy-saving kit.*** The evaluation team made savings adjustments to bathroom and kitchen faucet aerators and low-flow showerheads in cases where energy-saving kits were sent to homes with non-electric water heating.
- ***Some customer received multiple prescriptive kits and, as a result, received multiple furnace whistles that they would not be able to install.*** The evaluation team assumed that there might be eligible sockets and fixtures to install multiple LEDs and multiple water savings devices sent in the energy-saving kits; however, there is typically only one furnace per household where a furnace whistle can be installed. Accordingly, the evaluation team credited the program with a maximum of one furnace whistle per household[55] and removed the duplicates.

The demand reduction realization rate is higher than the energy-savings realization rate because of high installations of central AC and heat pumps. This is also why the demand reduction realization rate was higher in 2020 (80%) than in 2019 (40%): the number of these rebates issued increased by 264% in 2020 compared to 2019. These rebates accounted for 81% of the total *ex post* gross demand reduction and 28% of the total *ex post* gross energy savings, which led to the imbalance between energy savings and demand reduction results.

[55] The evaluation team defined a household as a record with a unique premise ID in the program tracking data.

RECOMMENDATIONS

For the energy-saving kits recipients, identify and implement a solution to address the issues caused by water heating and HVAC system fuel types not being tracked. For example, during the eScore Home Energy Assessment, the technician could ask customers about their water heater and HVAC system fuel types. To help customers accurately convey information about their systems, the questionnaire could provide information to help identify their systems:

- Natural gas water heaters typically have a big flue on top that vents outside (include an example image)
- Natural gas heating systems often lead to larger gas bills in the winter.

Monitor the number of kits customers receive and ensure that they only receive a reasonable number of measures (for example, limit furnace whistles to one per household). If a customer receives one kit then returns to the program for more energy-saving opportunities, direct them to an in-person or virtual audit so a technician can ensure that the customer only receives measures for which they are eligible.

CONCLUSION 3: Customers appear very satisfied with the new virtual assessment offering that was piloted during 2020 in response to the COVID-19 pandemic.

Customer survey results demonstrate that in-home and virtual participants are nearly equally satisfied with the time it took to complete their energy assessment and with the assessment overall. Virtual assessment participants are more satisfied than in-home participants with the professionalism of their technician, the amount of time between scheduling and the assessment, and the assessment report.

RECOMMENDATION

Continue to offer virtual assessments and monitor participant satisfaction with this offering. Explore why virtual assessment participants are more satisfied than in-home assessment participants with specific components of the energy assessment. Use the results to inform future assessment offerings and to determine whether additional enhancements are needed to drive satisfaction with in-home offerings.

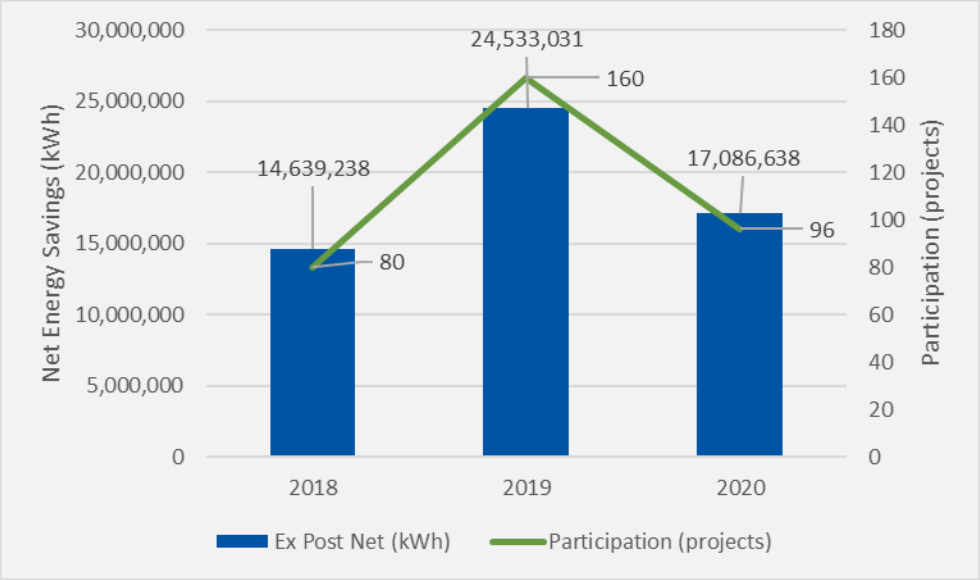
Custom Incentives Program

IPL provides two offerings through the Custom Incentives program: Custom and Retro-Commissioning (both discussed in greater detail below). Figure 61 shows a comparison of Custom Incentives program *ex post* net savings and participation over the last three years.

Participation in the Custom component remained stable (77 projects in 2020, 77 projects in 2019, and 80 projects in 2018). Due to the long timeframe often required for capital projects, many customers worked on their project over several months in 2020 and resumed their project once Indiana stay-at-home orders were lifted. However, Custom component per-project average *ex ante* savings declined by 32% from 2019 to 2020, and 2020 participants completed smaller compressed air, HVAC, lighting, refrigeration, and whole-building projects than 2019 participants.

Participation in the Retro-Commissioning program remained strong during the second year of the Retro-Commissioning component. The number of participants were higher in 2019 than in 2020, and the 2020 projects achieved 20% higher verified net savings on a per-project basis, which demonstrates an excellent upward trend in the saving impact per project.

Figure 61. Custom Incentives Program Savings and Participation, 2018 through 2020



Sources: Indianapolis Power & Light Company. Year-end DSM scorecards for 2018, 2019, and 2020.; Cadmus. Demand-side management evaluation reports for 2018 and 2019.

Program Description

The Custom Incentives program achieved 92% of its energy-savings goal and 60% of its demand reduction goal in 2020. This report discusses the design, delivery, and participant feedback for the Custom and Retro-Commissioning components separately. No Strategic Energy Management projects were reported in 2020.

Custom

Through the Custom component, IPL offers incentives to C&I customers who install energy efficiency measures that are not provided through the Prescriptive Rebates program. IPL calculates custom incentives based on a project's estimated annual energy savings. The program implementer, CLEAResult, oversees program management, delivery, and verification, relying primarily on contractors to promote and deliver the program to customers, with outreach support from IPL.

Retro-Commissioning

Through the Retro-Commissioning component, IPL offers rebates to C&I customers who conduct an approved retro-commissioning study, as well as incentives for any verified energy savings from implementing energy efficiency measures identified during the retro-commissioning study. The program implementer, Heapy Engineering, oversees program management, delivery, and verification. Heapy vets and preapproves retro-commissioning study providers, who conduct the retro-commissioning study to the required specifications. Study providers and Heapy then assist customers to implement all viable identified measures.

Research Objectives

The evaluation team addressed several research objectives for the Custom Incentives program:

- Determine whether the program met its goals and objectives
- Assess customer satisfaction with various program aspects
- Assess customer interest in in-person and virtual retro-commissioning offerings
- Identify whether the program influences customers' decisions and behaviors
- Calculate program spillover and freeridership estimates for the Custom and Retro-Commissioning components

Research Approach

To answer the research objectives outlined above, the evaluation team conducted several activities:

- Reviewed program materials
- Interviewed IPL, CLEAResult, and Heapy Engineering staff
- Surveyed 2020 Custom and Retro-Commissioning participants
- Assessed savings reported in VisionDSM, IPL's tracking database, against project documentation
- Examined whether claimed savings algorithms aligned with the Indiana TRM (v2.2) or other appropriate secondary sources
- Assessed the accuracy of *ex ante* savings assumptions and the operating schedules of installed equipment through site visits and desk reviews
- Performed virtual site visit measurement and verification (M&V) activities

Program Performance

IPL exceeded its goals for the 2020 Custom Incentives program while remaining within the program budget. As shown in Table 197, the program achieved 92% of its net energy-savings goal and 60% of its net demand reduction goal, and spent 76% of its budget.

Table 197. 2020 Custom Incentives Program Expenditures, Participation, and Savings

Metric	Net Goal [a]	*Ex Post* Net	Percentage of Goal
Energy Savings (kWh)	18,614,706	17,086,638	92%
Demand Reduction (kW)	2,852	1,705	60%
Participation (Projects)	N/A	96	N/A
Budget	$4,798,009	$3,645,838	76%

Note: Values rounded for reporting purposes.

[a] Goals per IPL's Settlement in DSM Cause #44945.

The Custom Incentives program achieved 17,086,638 kWh of net energy savings and 1,705 kW of net demand reduction, as shown in Table 198. Audited, verified, and *ex post* gross energy savings and demand reduction aligned well with *ex ante* values because CLEAResult and Heapy Engineering continued to provide well-documented project calculations, including pre- and post-data logging for some projects. Refer to the *Ex Post Gross Savings* section for further discussion of the resulting evaluation adjustments.

Table 198. 2020 Custom Incentives Program Savings Summary

Metric	*Ex Ante* Gross	Audited	Verified	*Ex Post* Gross	*Ex Post* Net
Custom					
Energy Savings (kWh)	17,944,442	17,720,975	17,720,975	17,481,883	14,335,144
Demand Reduction (kW)	2,308	2,383	2,383	2,065	1,693
Retro-Commissioning					
Energy Savings (kWh)	2,854,290	2,807,647	2,807,647	2,807,647	2,751,494
Demand Reduction (kW)	20	12	12	12	12
Total Program					
Energy Savings (kWh)	20,798,732	20,528,622	20,528,622	20,289,530	17,086,638
Demand Reduction (kW)	2,327	2,395	2,395	2,077	1,705

Table 199 lists the *ex post* gross and net energy adjustment factors resulting from the evaluation. The evaluation team assessed the Custom and Retro-Commissioning components for freeridership and spillover separately, but the two components ultimately yielded similar results. For Custom, freeridership was 18%, spillover was 0%, and the resulting NTG value was 82%. For Retro-Commissioning, freeridership was 2%, spillover was 0%, and the NTG was 98%. The Custom Incentives program overall achieved realization rates of 97.6% for energy savings and 89.2% for demand reduction.

Table 199. 2020 Custom Incentives Program Gross Realization Rates and Net-to-Gross Summary

Realization Rate		Program Component	Freeridership	Spillover	NTG
Energy Savings (kWh)	Demand Reduction (kW)				
97.4%	89.5%	Custom	18%	0%	82%
98.4%	60.4%	Retro-Commissioning	2%	0%	98%
97.6%	**89.2%**	**Total Program**	**N/A**	**N/A**	**-**

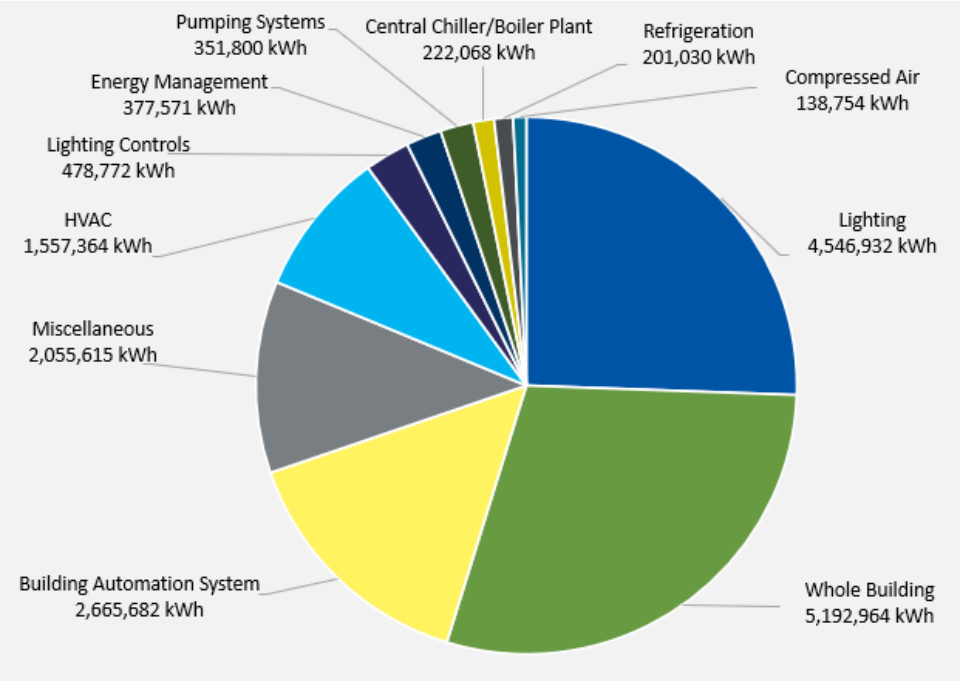
Impact Evaluation

To evaluate the Custom Incentives program in 2020, the team accessed data extracts from VisionDSM, which provided a census of measures that received incentives in 2020. Within the Custom Incentives program, IPL reported 20,798,732 kWh in *ex ante* energy savings and 2,327 kW in *ex ante* demand reduction. Results for the Custom and Retro-Commissioning components are outlined separately below.

Custom

To support an in-depth evaluation of Custom projects, CLEAResult provided the evaluation team with detailed files for each sampled project we identified in our data request. Figure 62 illustrates the 2020 Custom projects population by measure type, with associated energy savings. Retro-Commissioning measures, accounting for 2,854,290 kWh in *ex ante* savings, are not included in the figure.

Figure 62. 2020 Custom *Ex Ante* Distribution by Measure Category



Whole building was the largest single category in the 2020 Custom component, encompassing 26% of total *ex ante* savings. Whole-building measures typically involved new construction or major renovation projects, often claiming energy efficiency improvements (relative to code requirements) for LED lighting,

HVAC, and other measures. For whole-building measures, CLEAResult determined *ex ante* savings through building simulation models.

Lighting measures were generally large LED retrofits and included some daylighting and occupancy controls. Lighting measures, in addition to whole-building and building automation systems (BAS) measures, accounted for 72% of Custom *ex ante* energy savings. BAS measures include upgrades or changes to a facility's HVAC or lighting control system. Similar to Retro-Commissioning measures, the upgraded BAS allows for using advanced control strategies to improve the efficiency of the controlled equipment. The remaining measure types accounted for the remaining 30% of *ex ante* savings resulting from the Custom component of the Custom Incentives program.

To conduct an impact analysis of the Custom component, the evaluation team selected a representative sample of 54 measures to evaluate, then extrapolated findings to the larger population of 78 measures. The team used a PPS sampling approach and sampled 89% of Custom electric energy savings. Table 200 shows the population and sample sizes used for the Custom component in 2020.

Table 200. 2020 Custom Impact Sample Characteristics

Gross Population Count		Sample Measure Count		Evaluation Sample Share of Program Energy Savings
Unit	Measure	Actual	Target	
78	78	54	59	89%

In the other IPL C&I programs, project "measures" represent the number of unique energy efficiency upgrades performed in the population and "units" represent the quantity of each measure (such as number of light fixtures, capacity of heating equipment in MBh, or feet of pipe insulation). However, VisionDSM does not distinguish between measures and units for the Custom component (measure quantities are always one, regardless of size); therefore, both the population count and the measure count are the same. Further, each Custom measure is assigned a unique project ID, so "measure" and "project" may be used interchangeably throughout this program chapter.

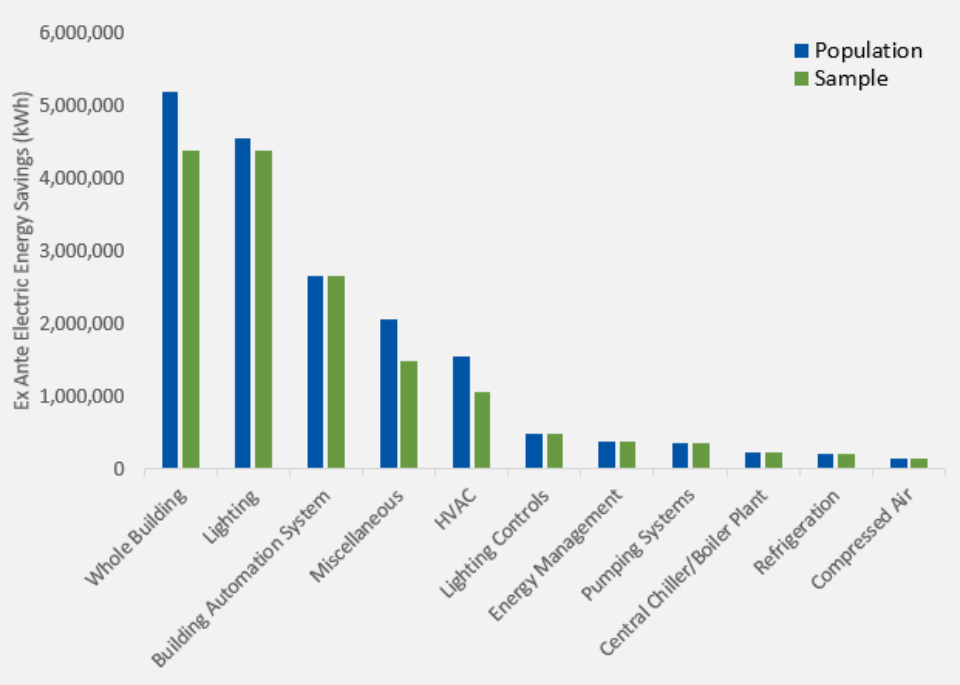
To inform the sampling targets for 2020, the team used evaluation findings from 2015 through 2019. By understanding the savings variability (error ratio) of the program's performance since 2015, the evaluation team could more effectively target the 2020 sample, which predicted that 59 measures would be needed to achieve 90% confidence at ±10% precision for the realization rate. The final evaluation sample included 54 measures. A higher-than-typical refusal rate from participants and delays in project data delivery limited the target sample count.

Historically, the composition of the Custom Incentives program measure population has been much more diverse than the measure population in the Prescriptive Rebates and SBDI programs, mainly because the Custom Incentives program has more non-lighting projects. The Custom Incentives program also tends to have a high percentage of savings concentrated in a relatively small number of large measures: In 2020, the top 10% of measures by energy savings represented 42% of the program population's *ex ante* savings. The evaluation adjustments made to these large saving measures had a

large effect on program-level realization rates. With these large projects included, the evaluation sample represented 90% of the population's *ex ante* energy savings.

Figure 63 shows the distribution of the Custom component sample and the population by measure category, using data from the tracking database.

Figure 63. 2020 Custom Sample *Ex Ante* Percentage Distribution by Measure Compared with Population



Ex ante energy savings in the sample closely correlated to the distribution of measure types in the total program population. The M&V plan for the three-year evaluation cycle included conducting site visits or virtual site visits each year to validate measure ISRs with 90% confidence at ±10% precision. The team performed an engineering review of nine on-site measures using virtual site visit M&V data, then supplemented with additional engineering desk reviews of 45 additional projects to increase the sample to 54 measures.

The team performed engineering reviews across all major measure types in the population and used the ISR to calculate verified savings. The team also calculated *ex post* savings using this ISR, but made further adjustments to savings based on other data obtained for the evaluated measures, such as metering data, AOH assumptions, equipment specification discrepancies, and interactive effects.

Audited Savings

The evaluation team calculated audited savings based on IPL's savings calculation methodology and using the quantity of installed units, building type, baseline equipment efficiency, and installed equipment efficiency. Audited savings are essentially a comparison of the reported savings from the tracking data to savings shown in the project files. The team checked savings reported in the tracking

database and found that CLEAResult's calculations and methodologies were thoroughly detailed and aligned with the supporting documentation. Because measures are custom, CLEAResult's methodology for determining *ex ante* savings varied from project to project and included several methods:

- Energy simulation models
- Pre- and post-installation power metering
- Analysis of BAS trend data
- Weather bin analysis
- Benchmarking baseline consumption with billing data
- Spreadsheet analysis with site-specific characteristics related to equipment application, capacity, wattage, annual operating schedules, HVAC setpoints, and other details

Slight differences between the *ex ante* and audited savings are due to rounding errors and to three sampled projects where the reported savings from the project documentation did not match the database. Table 201 summarizes the audited and *ex ante* savings for the Custom program component in 2020.

Table 201. 2020 Custom Audited Savings Summary

Metric	*Ex Ante*	Audited
Energy Savings (kWh)	17,944,442	17,720,975
Demand Reduction (kW)	2,308	2,383

Verified Savings

The team determined verified savings based on CLEAResult's energy-savings calculation methodology, supplemented with data collected through virtual site visits. The evaluation team performed virtual site visits to verify the installation of nine Custom sampled measures for the 2020 population. As previously mentioned, the installation units for Custom measures are not explicitly tracked in VisionDSM, so the team thoroughly reviewed additional project documentation to define and verify the measure unit quantity at each site. The team found no discrepancies in quantities during the virtual site visits and the Custom component retained a 100% ISR, meaning that the verified savings matched the audited savings for Custom in 2020. The team applied this ISR to the 2020 audited savings of 17,720,975 kWh and 2,383 kW to calculate the verified savings (shown in Table 202).

Table 202. 2020 Custom Verified Savings Summary

Metric	Audited	ISR	Verified
Energy Savings (kWh)	17,720,975	100.0%	17,720,975
Demand Reduction (kW)	2,383		2,383

Ex Post Gross Savings

The 2020 Custom component performed well with respect to *ex post* gross realization rates, resulting in 97.4% for energy savings and 89.5% for demand reduction (as was shown in Table 199 above). The evaluation team calculated *ex post* energy savings following methodologies outlined in the Indiana TRM (v2.2). For measures not identified in the Indiana TRM (v2.2), the team calculated *ex post* energy

savings based on custom engineering spreadsheet analysis, energy modeling, or a utility bill analysis (if the energy savings from the sampled measure exceeded 10% of the facility's total electric energy consumption). Generally, the team's *ex post* analysis methodology aligned with CLEAResult's *ex ante* methodology. CLEAResult used well-documented project calculations and provided a good description of each project upgrade, so the evaluation team could conduct comprehensive virtual site visit M&V.

Figure 64 and Figure 65 show adjusted gross savings realization rates and associated *ex ante* energy savings and demand reduction, respectively, for each sampled Custom project.

Figure 64. 2020 Custom Energy Savings Sample Results

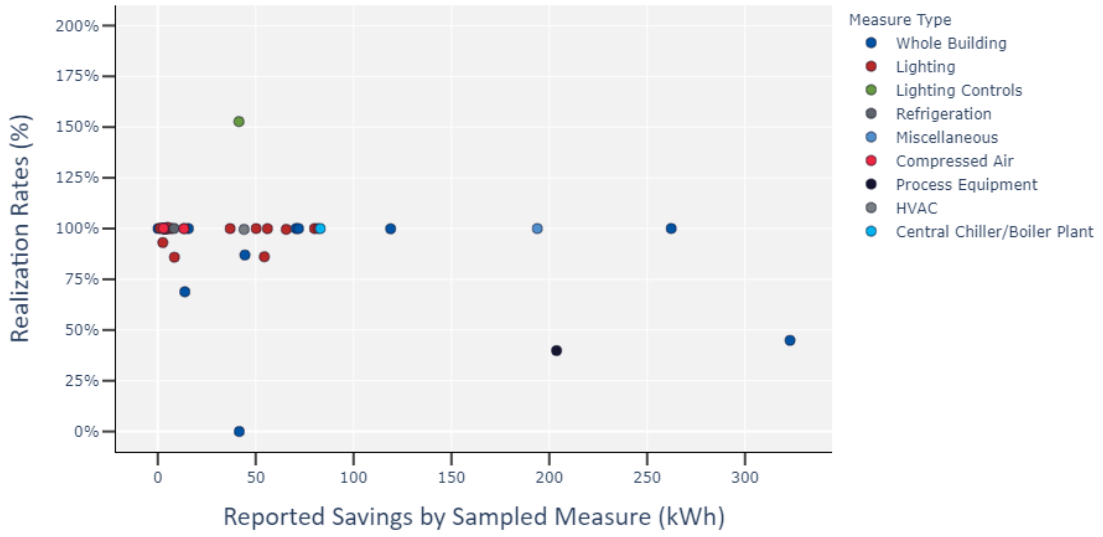
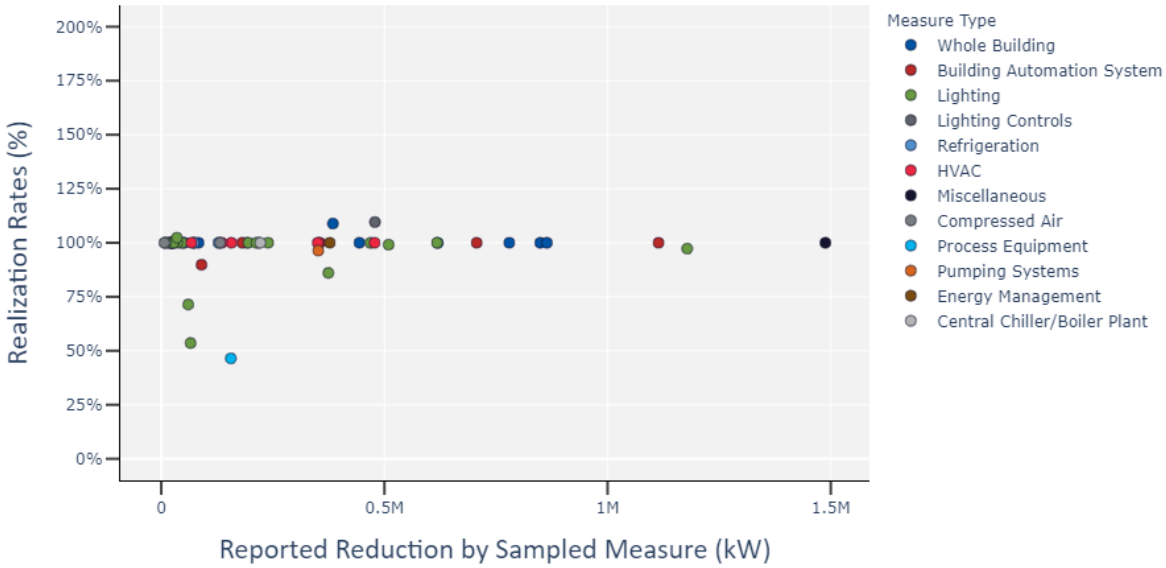


Figure 65. 2020 Custom Demand Reduction Sample Results



The majority of sampled projects (47 of 54) exhibited *ex post* energy savings within 5% of the reported *ex ante* savings. Where discrepancies were discovered, the team had made minor adjustments to energy savings due to differences in installed equipment performance specifications and energy model results. Seven projects exhibited realization rates above 105% or below 95%. The following summaries illustrate adjustments to these projects within the 2020 Custom Incentives program.

- Four lighting projects exhibited realization rates of 109.6%, 86.1%, 71.4%, and 53.6%. The evaluation team talked to the site contact for one lighting project, who provided the facility occupancy schedule and an estimate of the lighting operation hours. For the reported calculations, CLEAResult assumed 3,640 AOH, while the site contact indicated 2,600 AOH. The reduced AOH resulted in *ex post* energy savings being lower than *ex ante* savings (53.6%). For two other lighting projects, the team could not determine the baseline fixture types or quantities. We used a lumen equivalence methodology to identify the appropriate baseline fixtures. After calculating *ex post* energy savings, these two projects exhibited realization rates of 109.6% and 86.1%. The final lighting project, which realized 71.4% of the *ex ante* energy savings, involved the installation of high-efficiency lighting and occupancy sensors. Invoices included in the project documentation did not include occupancy sensors and the remaining project documents did not indicate that occupancy sensors were installed. The team evaluated *ex post* energy savings for this project excluding occupancy sensor savings.
- One project involved a building energy model to simulate energy savings for the sixth floor of an office building. In the reported documentation, CLEAResult used a net energy optimizer analysis report and provided the team with simulation model files for evaluation. The simulation models accurately simulated the building systems and associated energy use, but the reported savings did not match the energy model results. The team used the energy model simulation results as *ex post* energy savings, resulting in a 46.5% realization rate.
- For two of the 10 whole-building Custom projects, CLEAResult used net energy optimizer and eQuest energy simulation models to calculate energy savings. Both projects involved multiple high-efficiency upgrades to various systems within each building. The evaluation team collected the energy model files and energy model reports for both projects and found that the energy model simulation results did not match the reported savings. The energy models accurately simulated building performance, so the team used the simulation model results files as *ex post* energy savings. These two projects exhibited energy savings realization rates of 109.9% and 89.8%.

Table 203 shows the realization rates (of 97.4% for energy savings and 89.5% for demand reduction) and verification adjustments for the Custom component of the 2020 Custom Incentives program.

Table 203. 2020 Custom Realization Rates

Realization Rate (*Ex Post* Gross/*Ex Ante*)		ISR	ISR Precision at 90% Confidence
Electric Energy (kWh)	Peak Demand (kW)		
97.4%	89.5%	100%	±2.0%

Table 204 lists the aggregated *ex post* realization rates for each measure group in the Custom component evaluation sample. The team did not use the realization rates in Table 204 to determine

ex post gross savings for each measure type in the population; it is presented only to provide further detail of findings within the evaluation sample.

To calculate the *ex post* gross impacts, the team applied each sample's energy and demand realization rates to the *ex ante* energy savings and demand reduction, as shown in Table 205. The team calculated realization rates based on the sample and applied those rates to the population *ex ante* impacts.

Table 204. 2020 Custom Evaluation Sample Results by Measure Type

Measure Type	*Ex Post* Realization Rate		
	Measure Count	Energy	Demand
Building Automation System	6	100%	N/A
Central Chiller/Boiler Plant	1	100%	100%
Compressed Air	2	100%	100%
Energy Management	1	100%	N/A
HVAC	5	100%	150%
Lighting	22	97%	98%
Lighting Controls	1	110%	153%
Miscellaneous	1	100%	100%
Process Equipment	1	46%	40%
Pumping Systems	1	96%	N/A
Refrigeration	2	100%	274%
Whole Building	11	101%	70%

Table 205. 2020 Custom Incentives Program Realization Rates and *Ex Post* Gross Savings

Metric	*Ex Ante*	Realization Rate	*Ex Post* Gross
Electric Energy Savings (kWh)	17,944,442	97.4%	17,481,883
Peak Demand Reduction (kW)	2,308	89.5%	2,065

Note: Values rounded for reporting purposes.

Ex Post Net Savings

The evaluation team calculated 18% freeridership and 0% spillover using the methods described in *Appendix B* and survey data collected from 13 participants (out of 64 total who participated in the Custom component). As shown in Table 206, the team estimated a 82% NTG for the Custom component.

Table 206. 2020 Custom Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Custom	18%	0%	82%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The 2020 Custom freeridership estimate of 18% is within the upper and lower precision bounds of the previous years' freeridership estimates in 2019 (31%; n=11), 2018 (14%; n=15), 2017 (21%; n=16), and 2016 (19%; n=10). These differences between the yearly NTG results are not statistically significant at the 90% confidence interval.

Freeridership

The overall 18% freeridership is an average of the savings-weighted *intention* and *influence* freeridership scores from 13 respondents.[56] Refer to *Appendix B* for further details on the *intention* and *influence* questions and scoring methodologies.

***Intention* Freeridership**

The evaluation team estimated *intention* freeridership scores for all participants based on the responses of 13 participants to the *intention*-focused freeridership questions. The team translated responses into a matrix value and applied a consistent, rules-based calculation to obtain the final score. As shown in Table 207, the Custom component had an *intention* freeridership score of 33%.

Table 207. 2020 Custom *Intention* Freeridership Results

Program Component	Responses (n)	*Intention* Freeridership [a]
Custom	13	33%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Table 208 shows the unique Custom participant response combinations resulting from the *intention* freeridership questions, along with the *intention* freeridership score assigned to each combination and the number of responses for each combination. An "x" indicates a question that was skipped because of the participant's response to a previous question. The "Yes," "Partial," and "No" values in the table represent whether the respondent's answer to a given question was indicative of freeridership.

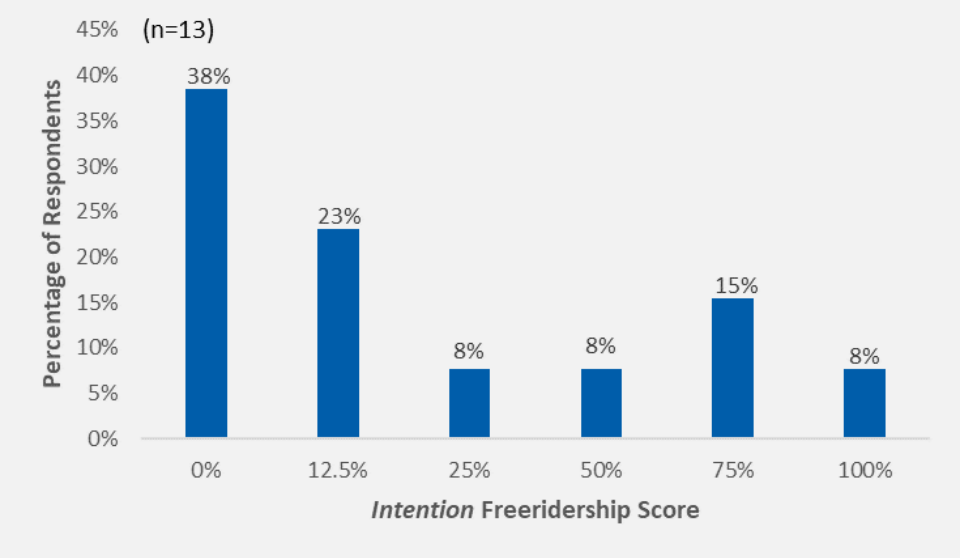
[56] The projects associated with the 13 respondents represent 38% of the total *ex post* gross kilowatt-hour program populations savings.

Table 208. 2020 Custom Frequency of *Intention* Freeridership Scoring Combinations

1. Installed same measure without incentive ?	2. Already ordered or installed?	3 Already planning to purchase ?	4. In capital budget ?	[Ask if Q1 is No] 5. Confirm, would not have installed any measure?	6. Installed same quantity ?	7. Installed same efficiency ?	8. Installed at the same time?	9. Organization has return on investment (ROI) goal?	[Ask if Q9 is Yes] 10. Program incentive was key to meeting goal?	Freeridership score	Response Frequency
Yes	Yes	x	x	x	x	x	x	x	x	100%	1
Yes	No	Yes	Yes	x	x	Yes	Partial	Yes	x	75%	1
Yes	No	Yes	Partial	x	Yes	No	x	x	x	0%	1
Yes	No	Yes	No	x	x	Yes	Yes	No	No	12.5%	1
Yes	No	Yes	No	x	x	Yes	No	x	x	0%	1
Yes	No	Partial	x	x	x	Yes	Yes	No	Yes	75%	1
Yes	No	No	x	x	x	Yes	Yes	Yes	x	50%	1
Yes	No	No	x	x	x	Yes	Partial	No	Yes	25%	1
Yes	No	No	x	x	x	Yes	Yes	No	No	12.5%	1
Partial	No	No	x	x	Yes	Partial	Partial	Yes	x	0%	1
Partial	No	No	x	x	x	Yes	Partial	Yes	x	12.5%	1
No	x	x	x	No	x	x	x	x	x	0%	2

Figure 66 shows the distribution of the *intention* freeridership scores for the Custom component.

Figure 66. 2020 Custom Distribution of *Intention* Freeridership Scores



Influence Freeridership

The evaluation team assessed *influence* freeridership by asking participants how important various Custom elements were in their purchasing decisions. Table 209 shows the elements participants rated for importance, along with a count and average rating for each factor.

Table 209. 2020 Custom *Influence* Freeridership Responses

Influence Rating	*Influence* Score	IPL Incentive	Energy Saving Opportunities Information from IPL	Recommendation from Contractor or Vendor	Previous IPL Energy Efficiency Program Participant
1 - Not at all important	100%	0	0	2	1
2	75%	1	4	0	1
3	25%	2	3	5	3
4 - Very important	0%	10	3	5	4
Not applicable	50%	0	3	1	4
Average Rating		**3.7**	**2.9**	**3.1**	**3.1**

The team determined each respondent's *influence* freeridership rating for each measure category using the maximum rating provided for any factor included in Table 209. As shown in Table 210, the respondents' maximum *influence* ratings ranged from 1 (*not at all important*) to 4 (*very important*). A maximum score of 1 meant the customer ranked all factors from the table as *not at all important*, while a maximum score of 4 means the customer ranked at least one factor as *very important*. Counts refer to the number of "maximum *influence*" responses for each factor, or *influence* score, response option.

Table 210. 2020 Custom *Influence* Freeridership Score

Maximum *Influence* Rating	*Influence* Score	Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)
1 - Not at all important	100%	0	0	0
2	75%	0	0	0
3	25%	1	592,191	148,048
4 - Very important	0%	12	4,876,288	0
Average Maximum *Influence* Rating (Simple Average)		**3.9**	**5,468,479**	**148,048**
Average *Influence* Score (Weighted by *Ex Post* Savings)				**3%**

The average *influence* score of 3% for the 2020 Custom component is weighted by *ex post* gross kilowatt-hour program savings.

Final Freeridership

The evaluation team calculated the mean of the *intention* and *influence* freeridership scores to estimate final freeridership for the Custom component of 18%:

$$Final\ Freeridership\ (18\%) = \frac{Intention\ Freeridership\ Score\ (33\%) + Influence\ Freeridership\ Score\ (3\%)}{2}$$

A higher freeridership score translates to more savings being deducted from the gross savings estimates. Table 211 lists the *intention*, *influence*, and final freeridership scores for the 2020 Custom component.

Table 211. 2020 Custom Freeridership Score

Program Component	Responses (n)	*Intention* Score	*Influence* Score	Freeridership Score
Custom	13	33%	3%	18%

Spillover

The evaluation team estimated spillover measure savings using specific information about participants, as determined through the evaluation, and employing the Indiana TRM (v2.2) as a baseline reference. The team planned to estimate Custom component spillover by dividing the sum of additional spillover savings (as reported by survey respondents) by the total gross savings achieved by all Custom respondents. However, none of the participants attributed their participation as being an influence on additional energy-efficient purchases. Therefore, the spillover estimate for Custom is 0% (Table 212).

Table 212. 2020 Custom Spillover

Spillover Savings (kWh)	Participant Program Savings (kWh)	Spillover
0	5,468,479	0%

Table 213 summarizes the percentage of freeridership, spillover, and NTG for Custom measures.

Table 213. 2020 Custom Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Custom	18%	0%	82%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Evaluated Net Savings Adjustments

Table 214 shows the energy savings, realization rate, and NTG for Custom.

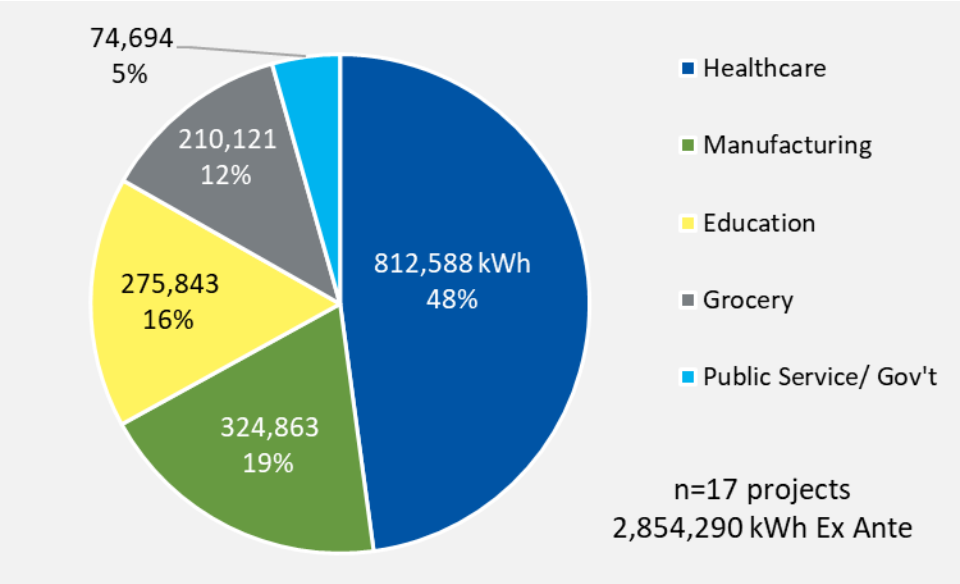
Table 214. 2020 Custom *Ex Post* Gross and Net Savings and Reduction

Savings Type	*Ex Ante* Gross	*Ex Post* Gross	Realization Rate	NTG	*Ex Post* Net Savings
Electric (kWh)	17,944,442	17,481,883	97.4%	82%	14,335,144
Demand (kW)	2,308	2,065	89.5%	82%	1,693

Retro-Commissioning

To evaluate Retro-Commissioning component measures in 2020, the team accessed data directly through Heapy Engineering, who provided details for a census of projects that received incentives in 2020 and all data associated with those projects. Figure 67 illustrates the Retro-Commissioning building type distribution by amount of energy savings. In 2020, Retro-Commissioning projects accounted for 2,854,290 kWh in *ex ante* savings. Buildings from a variety C&I sectors participated in the program, with the largest portion of savings from the healthcare sector. The grocery, education, and manufacturing sectors made up nearly 50% of the remaining population, and public service/government buildings made up 5% of the total population of *ex ante* energy savings. The makeup of the sectors represented in the 2020 Retro-Commissioning has diversified significantly from the makeup of sectors in 2019.

Figure 67. 2020 Retro-Commissioning *Ex Ante* Savings Distribution by Building Type



Source: Heapy Engineering 2020 project documentation.

Retro-Commissioning measures involve the systematic process of improving a facility's HVAC or process systems' efficiency through low-cost, no-cost improvements. Energy savings for retro-commissioning measures are typically reported in custom spreadsheet calculation workbooks. As a component within the Custom Incentives program, Retro-Commissioning measures accounted for 13.7% of the overall program *ex ante* savings.

Seventeen Retro-Commissioning projects were successfully completed in 2020 and the evaluation team reviewed all 17 sites. In most IPL C&I programs, project "measures" represent the number of unique energy efficiency upgrades performed in the population and "units" represent the quantity of each measure (such as number of light fixtures, capacity of heating equipment in MBh, or feet of pipe insulation). As previously mentioned, VisionDSM does not distinguish between these two items for the Custom Incentives program (where the quantity is always one, regardless of size). Therefore, for Retro-Commissioning measures, both the population count and the measure count are the same and represent the number of unique buildings participating in the program.

The team evaluated Retro-Commissioning projects through virtual verifications and documentation review. We interviewed the 10 project teams (representing all 17 buildings) to obtain qualitative feedback on their program experience and to estimate NTG. The evaluation team downloaded project documentation from the Heapy filesharing website and reviewed this documentation and other relevant program data, focusing on calculation procedures and energy-savings estimate documentation. Retro-Commissioning projects often involved multiple efficiency control measures, implemented simultaneously and resulting in high levels of interactive effects. Consequently, the evaluation team prefers to evaluate Retro-Commissioning projects through virtual site visits so we can observe the implemented changes.

These virtual visits enabled the evaluation team to accomplish three primary tasks:

- Verify the implementation, installation, and characteristics of incented equipment
- Collect additional detailed equipment data needed to confirm and calculate energy savings
- If applicable, collect available energy management systems data to inform the savings analysis

The evaluation team performed an engineering analysis to validate energy savings and demand reduction for each 2020 project. The procedures we used to validate savings depended on the measure types analyzed, but primarily involved extracting data verified from the site and supplementing details using the project documentation submitted. As a primary step, the evaluation team relied on industry-standard algorithms, secondary research, and our engineering experience. As a secondary step, we also relied on utility bill data and trend data to verify savings. The evaluation team reviewed Heapy's M&V calculations. In most cases, we also collected utility billing data and performed a utility bill analysis to inform the reasonableness of the reported savings.

Ex ante savings by project varied among the population of projects, with the top six largest projects making up 74% of the total Retro-Commissioning *ex ante* energy savings in 2020. The largest single project represented 16% of the total Retro-Commissioning *ex ante* energy savings.

Audited Savings

The evaluation team conducted an audit of measures in the population and adjusted energy savings. The team checked savings reported in the tracking database and found that Heapy's calculations and methodologies aligned with the supporting documentation in most cases. We made adjustments to three projects, where Heapy did not correctly transfer the data presented in the final M&V report over to the final *ex ante* values. Because Retro-Commissioning projects and measure are custom, Heapy's methodology for determining *ex ante* savings varied from project to project and included several methods:

- BAS trend data analysis
- Weather bin analysis
- Benchmarking of baseline consumption with billing data
- Spreadsheet analysis with site-specific characteristics related to equipment application, capacity, wattage, AOH, HVAC setpoints, and other details

Table 215 summarizes the audited and *ex ante* savings for the Retro-Commissioning component in 2020.

Table 215. 2020 Retro-Commissioning Audited Savings Summary

Metric	*Ex Ante*	Audited
Energy Savings (kWh)	2,854,290	2,807,647
Demand Reduction (kW)	20	12

Verified Savings

The evaluation team determined verified savings based on Heapy's energy-savings calculation methodology and supplemented with data collected through virtual site visits. The team performed site visits to verify the installation of 17 measures in the 2020 population. As previously mentioned, the installation units for Retro-Commissioning measures are not explicitly tracked in VisionDSM, so the team had to thoroughly review additional project documentation to define and verify the measure unit quantity at each site. The team found no discrepancies in quantities between Heapy's documentation and our site visits, and the Retro-Commissioning component retained a 100% ISR, meaning that verified savings matched audited savings in 2020. The team applied this ISR to the 2020 audited savings of 2,807,647 kWh and 12 kW to calculate the verified savings (shown in Table 216).

Table 216. 2020 Retro-Commissioning Verified Savings Summary

Metric	Audited	ISR	Verified
Energy Savings (kWh)	2,807,647	100.0%	2,807,647
Demand Reduction (kW)	12		12

Ex Post Gross Savings

The Retro-Commissioning measures overall performed well with respect to *ex post* gross realization rates, resulting in 98% for energy savings and 60% for demand reduction.

Heapy Engineering used different M&V analysis methods depending on the project circumstances and measure details. Generally, Heapy used industry standard spreadsheet savings calculations and BAS trend data to determine savings on an individual measure level. Heapy used well-documented project calculations and provided a detailed description of each measure upgrade, so the evaluation team could conduct comprehensive virtual site visit M&V. The team's *ex post* data analysis aligned closely with the findings from Heapy. Figure 68 and Figure 69 show adjusted gross savings realization rates and associated *ex ante* energy savings and demand reduction, respectively, for each Retro-Commissioning project, grouped into sector type categories for comparing the magnitude of savings and realization rates achieved.

Figure 68. 2020 Retro-Commissioning Energy Savings Results by Sector

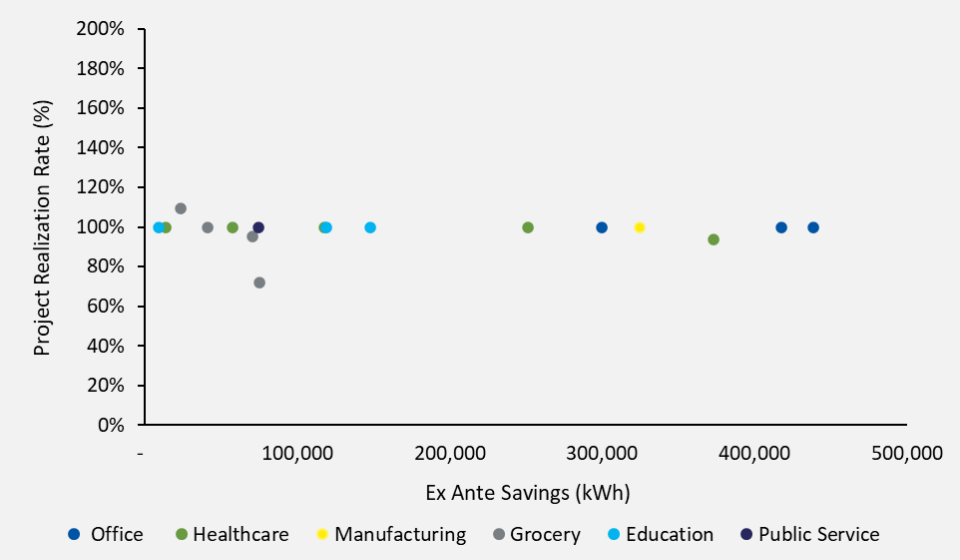
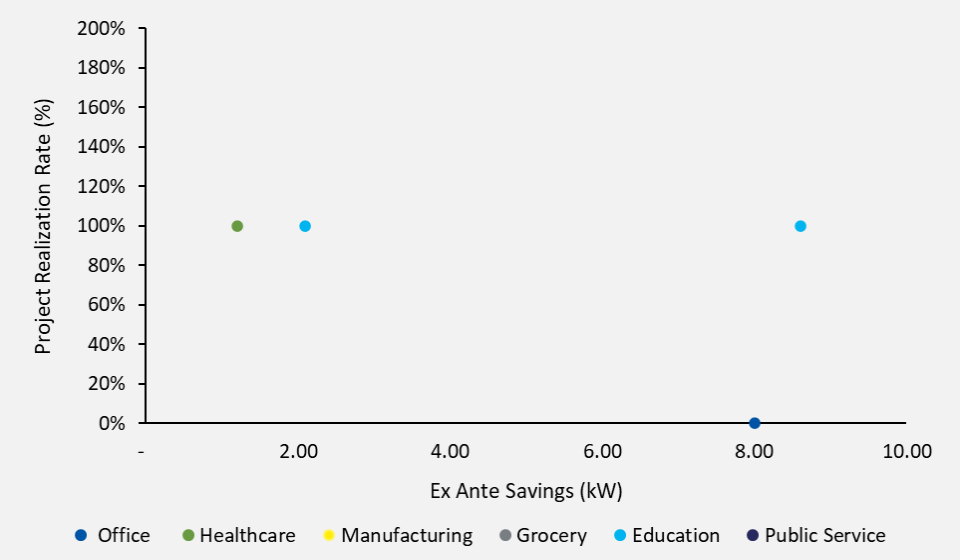


Figure 69. 2020 Retro-Commissioning Demand Reduction Results by Sector



As shown in the figures, the majority of projects exhibited *ex post* energy savings at 100% of reported *ex ante* savings. Where discrepancies were discovered, the team had made minor adjustments to energy savings and to some of the savings calculation methodologies based on the success of implementing the Retro-Commissioning measures. Five projects exhibited kWh realization rates that deviated from 100%, and one project exhibited a kW realization rate that deviated from 100%. A discussion of all modifications made to projects is below, note that some projects received more than one modification:

- As noted in the *Audited Savings* section, for one project Heapy claimed *ex ante* demand reduction that was not supported by the final M&V documentation provided. It appears that this reduction was derived from the projected savings appearing in the study report rather than from the verified savings appearing in the M&V report. This project did not achieve or claim any demand reduction that was supported with M&V documentation (and therefore the demand reduction realization rate for this project was 0%).
- For two projects, the evaluation team modified the occupied schedule for air-handling units after viewing the BAS settings with the customer during a virtual site visit. The proposed schedule would result in interior temperatures that were too cold (or too warm) to meet occupant satisfaction in the morning, particularly on Monday mornings after the units had been set back for the weekend. The customer modified the scheduling to start the units up several hours earlier than proposed in the study or verified in the M&V process. The customer is satisfied with this recent change and intends to maintain the units as currently scheduled. For one project, this modification applied to all the air-handling units and resulted in a cumulative realization rate reduction of 7% for the project. For the other project, the modification applied to only a few air-handling units and resulted in a cumulative realization rate reduction of less than 1% for the project.
- For two projects, the evaluation team modified the assumptions within commercial refrigeration equipment temperature float and suction calculations. We referenced a different source for the percentage savings per degree Fahrenheit of float (raising this to 2% from 0.9%), which resulting in higher savings for the measure. The team also modified the delta temperature difference, which reduced savings. The original value reflected a delta temperature between the high and low limit, while the modified value reflected the average temperature difference from the baseline. For the *ex ante* analysis, Heapy assumed that the system would constantly be operating at 20 PSI. However, the system will variably float between the two limits. The evaluation team adjusted the analysis based on the assumption that the weighted annual average suction temperature is the average between the two temperature limits. Cumulatively, these project modifications resulted in a 10% increase in savings for this measure (for both projects).
- The evaluation team modified the savings calculation for a lighting scheduling measure to reflect a full 168-hour week. The original calculations incorrectly specified only 154 hours in a full week, effectively claiming that lighting was off for the remaining hours of the week. However, the documentation provided and the store hours posted indicate that the lighting system is on at some power level all the time (24 hours per day, every day). This modification resulted in a realization rate reduction of 50% for the measure.

- Three Retro-Commissioning projects claimed savings for adjustments that were made to the occupied space temperature setpoints. The original setpoints were within ASHRAE Standard 55[57] bounds for occupant comfort, and the modified setpoints are likely also within these bounds. The evaluation team did not verify the marginal savings gains and losses that resulted from these modifications. Where these measures were paired with modifications to the unoccupied (setback) temperature setpoints, we reinstated the original occupied setpoints to accurately determine the savings for only the unoccupied time periods. This modification resulted in a measure-level realization rate of 0% for one project, 95% for one project, and 100% for one project. For this 100% project, the adjustment only effected the measure therm savings, not the energy savings or demand reduction. The team does not recommend allowing modified occupied temperature setpoint as a viable retro-commissioning measure. Modifications made to occupied temperature setpoints typically are short lived (short measure life), and result in limited efficiency gains which may be achieved at the expense of occupant comfort. Occupied temperatures are ultimately under the control of the building occupants, who typically make adjustments frequently. It is therefore difficult to ensure that first-year savings will be sustained. Incentivizing modifications to the occupied temperature setpoints potentially creates the incentive to adjust the occupied temperature setpoints outside of the ASHRAE 55 comfort zone, or at least outside the comfort zone established by the occupants or function of the building.

The evaluation team identified the following potential issues within the 2020 projects, but these issues did not result in any adjustments made to the 2020 projects:

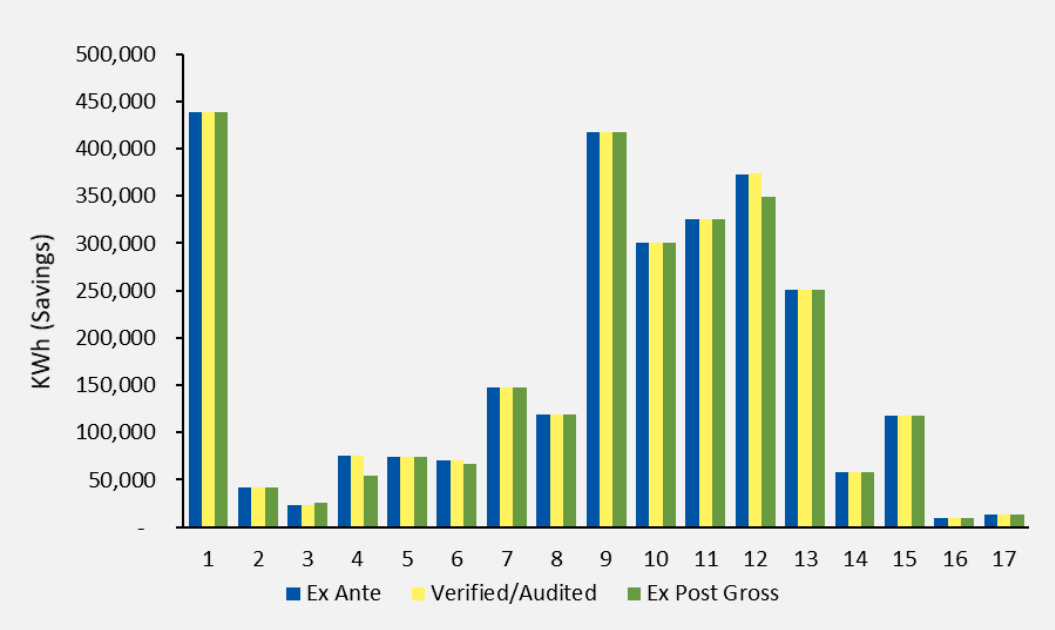
- Heapy developed several measures (documented in the small business retro-commissioning calculator) where the estimated natural gas savings were likely overestimated. In one instance, the expected natural gas savings for the measure were nearly equal to the total natural gas consumption at the office facility. Since IPL is not a natural gas utility, this error is inconsequential to the scope of the evaluation. However, this error might indicate that the small business retro-commissioning calculator in particular needs additional quality control verification to produce accurate savings, particularly if Heapy will continue using this tool for Retro-Commissioning component projects in subsequent years.
- The 2020 Retro-Commissioning component eligibility guidance indicates that buildings with programmable thermostats are not eligible to participate in the program. The primary reason for this guideline is that facilities with BAS control have more advanced scheduling and sequencing parameters, allowing building managers to employ greater potential energy-saving strategies. A second reason is that buildings with a sophisticated control system tend to have larger, more complex HVAC systems, which provide greater potential for adjustments and improvements. Buildings controlled by a programmable thermostat have very limited improvement potential. In the 2020 program, at least one building was fully controlled by programmable thermostats. A second building was potentially controlled by thermostats, but the study was self-generated, and therefore the evaluation team did not have sufficient details

[57] ANSI/ASHRAE Standard 55-2017, Thermal Environmental Conditions for Human Occupancy.

about the control system to confirm this detail. Both facilities were only able to pursue limited measures, resulting in low ex ante savings and a high cost-to-savings ratio.

Figure 70 shows the evaluation team's final *ex post* gross findings compared to the *ex ante* savings consumption for the population of 17 Retro-Commissioning projects.

Figure 70. 2020 Retro-Commissioning *Ex Ante* versus *Ex Post* Gross Savings by Project



Ex Post Gross Savings Realization Rates

Table 217 shows the realization rates (of 98% for energy savings and 60% for demand reduction) and verification adjustments for 2020 Retro-Commissioning measures. To calculate the *ex post* gross impacts, the team applied the sample's realization rates to the population *ex ante* energy savings and demand reduction.

Table 217. Application of 2020 Retro-Commissioning Realization Rates

Metric	Population *Ex Ante*	Realization Rate (from Evaluation Sample)	Population *Ex Post* Gross
Electric Energy Savings (kWh/year)	2,854,290	98%	2,807,647
Peak Demand Reduction (kW)	20	60%	12

Ex Post Net Savings

The evaluation team calculated 2% freeridership and 0% spillover using the methods described in *Appendix B* and the survey data collected from all 10 Retro-Commissioning participants. As shown in Table 218, the team estimated a 98% NTG for Retro-Commissioning measures.

Table 218. 2020 Retro-Commissioning Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Retro-Commissioning	2%	0%	98%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

The team estimated the 2% Retro-Commissioning freeridership using self-reported responses. Note that because the program component is new and has a small sample size, there may be large variation from year-to-year until the program matures. The 2019 freeridership value was 32%, which was influenced by relatively few yet unique customer participants and because two of the three customers already had retro-commissioning plans in place prior to learning of the incentive program from IPL.

Freeridership

The overall 2% freeridership is an average of the savings-weighted *intention* and *influence* freeridership scores from the 10 respondents.

***Intention* Freeridership**

The evaluation team estimated *intention* freeridership scores for all 10 participants based on their responses to the *intention*-focused freeridership questions. The team translated responses into a matrix value and applied a consistent, rules-based calculation to obtain the final score. As shown in Table 219, Retro-Commissioning had an *intention* freeridership score of 4%.

Table 219. 2020 Retro-Commissioning *Intention* Freeridership Results

Program Component	Responses (n)	*Intention* Freeridership [a]
Retro-Commissioning	10	4%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Table 220 shows the unique Retro-Commissioning participant response combinations resulting from the intention freeridership questions, along with the intention freeridership score assigned to each combination and the number of responses for each combination. An “x” indicates a question that was skipped due to the participant’s response to a previous question. The “Yes,” “Partial,” and “No” values represent whether the respondent’s answer to a given question was indicative of freeridership.

Table 220. 2020 Retro-Commissioning Frequency of *Intention* Freeridership Scoring Combinations

1. Would have pursued RCx without incentive?	2. Already identified and planned to implement measures identified in RCx study before heard about IPL program?	3. Planned to conduct RCx before learning about IPL program?	4. In capital budget?	5. Confirm, would not have pursued RCx study or implemented measures this year without program?	6. Would have pursued as many measures without program?	7. Pursued and installed on same timeline?	8. Organization has ROI goal?	9. Program incentive was key to meeting goal?	*Intention* Freeridership score	Final Freeridership Score
Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	100%	50%
No	No	No	No	Yes	No	Partial	Yes	Yes	0%	0%
No	No	No	No	Yes	No	Partial	Yes	Yes	0%	0%
No	No	No	No	Yes	No	No	Yes	Yes	0%	0%
No	No	No	No	Yes	No	Partial	Yes	Yes	0%	0%
No	No	Yes	No	Yes	No	Partial	Yes	Yes	0%	0%
No	No	No	No	Yes	No	No	Yes	Yes	0%	0%
No	No	No	No	Yes	No	Partial	Yes	Yes	0%	0%
No	No	No	No	Yes	No	No	Yes	Yes	0%	0%
No	No	No	No	Yes	No	No	Yes	Yes	0%	0%

RCx = Retro-Commissioning

***Influence* Freeridership**

The evaluation team assessed *influence* freeridership by asking participants how important various Retro-Commissioning elements were in their purchasing decisions. Table 221 shows the elements participants rated for importance, along with a count and average rating for each factor.

Table 221. 2020 Retro-Commissioning *Influence* Freeridership Responses

Influence Rating	*Influence* Score	IPL Rebate for the Study Costs	IPL Incentive for Savings Achieved	Energy Saving Opportunities Information from IPL	Recommendation from Contractor or Vendor	Previous IPL Energy Efficiency Program Participant
1 - Not at all important	100%	-	-	1	1	-
2	75%	-	2	-	-	-
3	25%	-	-	8	6	8
4 - Very important	0%	8	8	1	3	2
Not applicable	50%	2	-	-	-	-
Average Rating		**4.0**	**3.6**	**2.9**	**3.1**	**3.2**

The team determined each respondent's *influence* freeridership score for each measure category using the maximum rating provided for any factor included in Table 221. As shown in Table 222, the respondents' maximum *influence* ratings ranged from 1 (*not at all important*) to 4 (*very important*). A maximum score of 1 meant the customer rated all factors from the table as *not at all important*, while a maximum score of 4 meant the customer rated at least one factor as *very important*. Counts refer to the number of "maximum *influence*" responses for each factor, or *influence* score, response option. All respondents rated at least one factor as very important, generating a maximum influence score of 4.0, resulting in 0% *influence* freeridership.

Table 222. 2020 Retro-Commissioning *Influence* Freeridership Score

Maximum *Influence* Rating	*Influence* Score	Count	Total Survey Sample *Ex Post* Savings (kWh)	*Influence* Score Savings (kWh)
1 - Not at all important	100%	-	-	-
2	75%	-	-	-
3	25%	-	-	-
4 - Very important	0%	10	2,807,647	0
Average Maximum *Influence* Rating (Simple Average)		**10**	**-**	**4**
Average *Influence* Score (Weighted by *Ex Post* Savings)				**0%**

The team weighted the average *influence* score of 0% for the 2020 Retro-Commissioning component by *ex post* kilowatt-hour component savings.

Final Freeridership

The evaluation team calculated the mean of *intention* and the *influence* of freeridership components to estimate final freeridership for the program of 2%.

$$Final\ Freeridership\ (2\%) = \frac{Intention\ FR\ Score\ (4\%) + Influence\ FR\ Score\ (0\%)}{2}$$

A higher freeridership score translates to more savings being deducted from the gross savings estimates. Table 223 lists the *intention*, *influence*, and final freeridership for 2020 Retro-Commissioning measures.

Table 223. 2020 Retro-Commissioning Freeridership Score

Program Component	Responses (n)	*Intention* Score	*Influence* Score	Freeridership Score
Retro-Commissioning	10	4%	0%	2%

Spillover

The evaluation team estimated spillover measure savings using specific information about participants, as determined through the evaluation, and employing the Indiana TRM (v2.2) as a baseline reference. The team planned to estimate spillover by dividing the sum of additional spillover savings (as reported by survey respondents) by the total gross savings achieved by all Retro-Commissioning respondents. However, none of the participants attributed their program participation as an influence on additional energy-efficient purchases. Therefore, the spillover estimate for Retro-Commissioning is 0%. Table 224 summarizes the percentage of freeridership, spillover, and NTG for Retro-Commissioning.

Table 224. 2020 Retro-Commissioning Net-to-Gross Summary

Program Component	Freeridership [a]	Spillover	NTG
Retro-Commissioning	2%	0%	98%

[a] The team weighted freeridership by the survey sample *ex post* gross kilowatt-hour savings.

Evaluated Net Savings Adjustments

Table 225 shows the energy savings, realization rate, and NTG for Retro-Commissioning measures.

Table 225. 2020 Retro-Commissioning *Ex Post* Gross and Net Savings and Reduction

Savings Type	*Ex Ante* Gross Savings	*Ex Post* Gross Savings	Realization Rate	NTG	*Ex Post* Net Savings
Electric (kWh)	2,854,290	2,807,647	98%	98%	2,751,494
Demand (kW)	20	12	60%	98%	12

Process Evaluation

This section describes process findings for the Custom and Retro-Commissioning components of the Custom Incentives program. The evaluation team conducted a database and materials review, participant survey, and stakeholder interview. The evaluation scope did not include a process evaluation of strategic energy management measures, which were not part of the Custom Incentives program in 2020.