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Ameren Illinois Company 2019 Integrated Impact Evaluation Report

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Opinion Dynamics

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1. Executive Summary

This report presents impact evaluation results from Ameren Illinois Company's (AIC) 2019 portfolio of energy efficiency programs implemented during the 2019 calendar year. The overarching objective of the 2019 impact evaluation is to determine the gross and net electric energy, electric demand, and natural gas impacts associated with the AIC energy efficiency portfolio. The purpose of this report is to aggregate results from AIC's Residential and Business Programs and present the utility's performance relative to energy savings metrics codified in the Future Energy Jobs Act (FEJA).

Key performance metrics include:

- **Cumulative Persisting Annual Savings (CPAS):** Beginning in 2018, electric energy savings goals for Illinois utilities are defined based on persisting savings as a percentage of sales. As such, annual evaluations of AIC's programs, including this one, present both first-year savings as well as persisting savings over the life of delivered measures.
- **Weighted Average Measure Life (WAML):** FEJA allows AIC to create a regulatory asset and amortize and recover the total expenditures of that regulatory asset" over a period that is equal to the weighted average of the measure lives implemented for that year that are reflected in the regulatory asset."[1] Therefore, we present WAML for AIC's electric energy efficiency programs within this report in accordance with the guidelines for calculation presented in the Illinois Stakeholder Advisory Group's (SAG) WAML Report. [2]
- **Applicable Annual Incremental Goal (AAIG):** The AAIG is defined as the difference between the cumulative persisting electric savings goal for the year being evaluated and the cumulative persisting electric savings goal for the previous year. The utility must achieve sufficient savings through its programs to replace savings from measures at the end of their measure life before progress can be counted towards the AAIG.

1.1 Background

This is the second calendar year of AIC's four-year 2018 Plan, which was developed based on guidance provided through Illinois Senate Bill 2814 (the Future Energy Jobs Act [FEJA]). Passage of FEJA has led to a number of significant changes in energy efficiency program delivery in Illinois, including the following:

- **Discontinuation of energy efficiency programs funded through the Illinois Power Agency (IPA):** Energy efficiency programs adopted through the IPA procurement plan process and previously available to AIC customers, including several residential programs, ended on May 31, 2017.
- **Discontinuation of energy efficiency programs offered through the Illinois Department of Commerce and Economic Opportunity (DCEO):** Before the Transition Period (June 1, 2017, to December 31, 2017), public housing facilities were ineligible for AIC energy efficiency programs and instead were served by programs offered through the DCEO. As of June 1, 2017, these customers became eligible for AIC programs and the Transition Period allowed AIC to begin to integrate these customers into its programs and beginning in 2018, public housing facilities served by AIC are fully eligible for the AIC Residential Program in the same manner as other AIC customers.

[1] Weighted Average Measure Life Report. Illinois Energy Efficiency Stakeholder Advisory Group. February 20, 2018.
[2] Ibid.

- **Change in eligibility for the largest AIC customers:** As part of FEJA, customers with electric demand of over 10 MW became ineligible for AIC programs as of June 1, 2017. These customers historically provided a majority or near-majority of Business Program electric energy savings, so their exclusion from AIC programs moving forward has had significant effects on the Program and required the Program to generally pursue larger numbers of smaller projects than its past focus. This change particularly affected the Custom Initiative, which historically has derived 50% or more of its energy savings from 10 MW customers.
- **Savings Conversion:** FEJA allows electric utilities that jointly offer an energy efficiency measure or program with a gas utility to fund said measures or programs if the gas utility discontinues doing so and to recover the cost of doing so. In this case, the electric utility is allowed to "convert" non-electric energy savings achieved through said measures or programs to electric savings for the purposes of goal attainment. The total amount of savings allowed to be converted is capped at a maximum of 10% of the utility's AAIG. AIC met the above criteria in 2019 and chose to convert savings from the Income Qualified Initiative of the Residential Program. Further detail on the savings conversion is provided in the forthcoming 2019 AIC Integrated Impact Evaluation Report.

1.2 2019 Portfolio Savings

1.2.1 Annual Savings

Table 1 presents annual savings achieved by the 2019 AIC portfolio. The conversion of some gas savings to electric energy savings for goal attainment purposes is discussed further in Section 4.1.

Table 1. 2019 AIC Portfolio Annual Savings

	Energy Savings (MWh)	Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	390,829	62.47	6,072,355
Gross Realization Rate[a]	101%	102%	93%
Verified Gross Savings	394,715	64.77	5,676,341
NTGR	0.824	0.833	0.823
Verified Net Savings Before Conversion, NPSO, BOC	325,354	53.94	4,673,230
Verified Net Savings with NPSO Adder and BOC	328,643	54.49	4,727,559
Converted Savings	15,805	N/A	-539,404
Verified Net Savings After Conversion	344,447	54.49	4,188,155

[a] Gross realization rates for demand do not consider demand savings for the Behavioral Modification Initiative or Voltage Optimization Program, neither of which report ex ante demand savings. Therefore, the gross realization rate for demand cannot be directly calculated from values presented in this table.

1.2.2 Applicable Annual Incremental Goal Achievement

AIC achieved 93% of its 2019 AAIG for electric savings. 2019 AAIG achievement is presented in Table 2.

Table 2. 2019 AIC Portfolio AAIG Achievement

Metric	MWh
2019 Annual Net Savings	344,447
2019 Expiring CPAS from Legislation	167,464
2019 Expiring CPAS from 2018 Portfolio	6,984
2019 Annual Incremental Savings Achieved	169,999
2019 AAIG	182,214
% of 2019 AAIG Achieved	93%

1.2.3 Cumulative Persisting Annual Savings

Table 3 summarizes overall CPAS and WAML for the 2019 AIC Portfolio. The overall WAML for the portfolio is 12.2 years.

Table 3. 2019 AIC Portfolio CPAS and WAML

Initiative	WAML	First-Year Verified Gross Savings (MWh)	NTGR	CPAS – Verified Net Savings (MWh)							Lifetime Savings (MWh)
				2018	2019	2020	2021	...	2030	...	
Retail Products	9.1	114,127	0.716		81,770	81,770	49,955	...	24	...	419,631
IQ - CAA	14.9	815	1.000		815	815	555	...	415	...	10,188
IQ - SF	14.7	9,332	1.000		9,332	9,332	7,809	...	3,819	...	102,091
IQ - MF	10.7	1,630	1.000		1,630	1,630	1,460	...	127	...	15,304
IQ - Smart Savers	11.0	2,824	1.000		2,824	2,824	2,824	...	0	...	31,067
IQ - SF (gas conversion)	18.5	13,121	1.000		13,121	13,121	13,121	...	6,997	...	188,627
Public Housing	10.4	1,162	1.000		1,162	1,162	768	...	92	...	8,605
Behavior Modification	5.0	1,061	1.000		1,061	783	484	...	0	...	2,700
HVAC	16.5	9,130	0.755		6,890	6,890	6,890	...	3,954	...	83,825
Appliance Recycling	6.5	5,147	0.541		2,786	2,786	2,786	...	0	...	20,894
Multifamily	10.3	1,424	0.921		1,311	1,311	1,141	...	3	...	12,015
DD - School Kits	8.8	2,014	0.931		1,874	1,874	1,340	...	0	...	12,586
DD - Appliance Recycling Kits	8.9	120	1.000		120	120	85	...	0	...	793
DD - Community Kits	9.1	980	1.000		980	980	642	...	0	...	6,241
Residential NPSO	9.5	4,120	N/A		2,966	3,068	2,025	...	140	...	18,000
Standard	13.3	199,497	0.866		172,771	172,741	171,413	...	122,623	...	2,158,753
Custom	14.8	27,583	0.822		22,673	22,673	22,618	...	19,644	...	335,275
Custom (gas conversion)	14.4	2,858	0.939		2,684	2,684	2,684	...	2,684	...	38,609
Retro-Commissioning	5.3	4,680	0.890		4,165	4,159	3,946	...	0	...	22,183
Streetlighting	12.0	4,014	1.000		4,014	4,014	4,014	...	3,324	...	42,647
BOC	14.9	322	N/A		322	322	322	...	303	...	4,648
Voltage Optimization	15.0	9,175	N/A		9,175	9,175	9,175	...	9,175	...	137,619
2019 CPAS		**415,135**	**0.830**		**344,447**	**344,234**	**306,057**	**...**	**173,322**	**...**	**3,672,299**
Expiring 2019 CPAS					**0**	**213**	**38,178**	**...**	**45,128**	**...**	
Expired 2019 CPAS					**0**	**213**	**38,391**	**...**	**171,125**	**...**	
WAML	**12.2**										

2. Overview of the AIC Portfolio

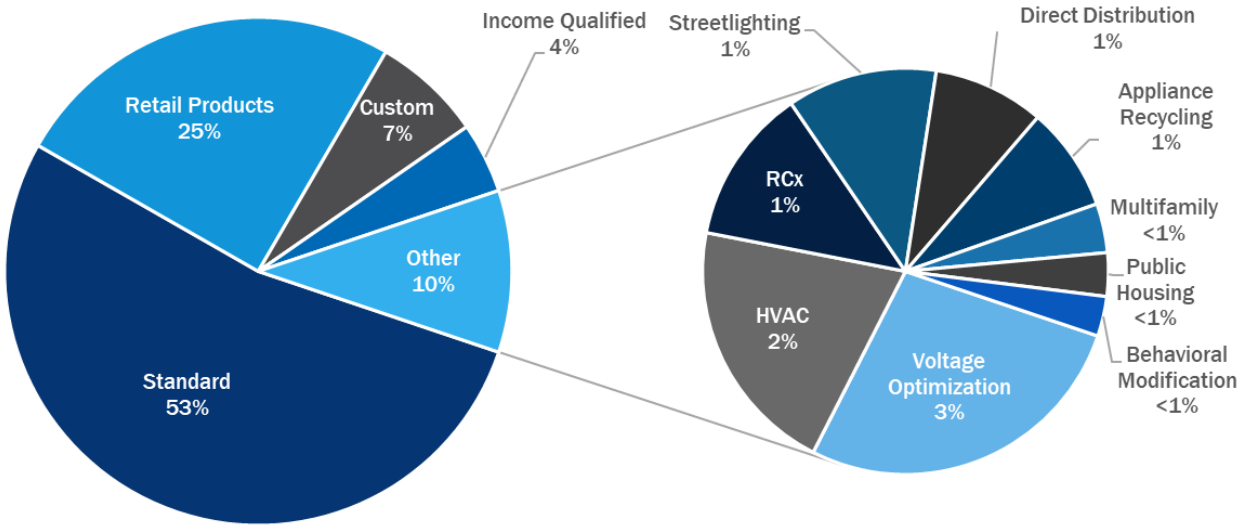
AIC's 2019 portfolio is made up of two programs: the Residential Program and the Business Program. Each program is made up of a number of initiatives as detailed in Table 4 below.

Table 4. 2019 AIC Portfolio Program Descriptions

Program	Initiative	Description
Residential	Retail Products	Residential efficient products, including upstream lighting and advanced thermostat and appliance rebates
	Income Qualified – CAA	Whole-building low income program, including direct install and shell measures, delivered through Community Action Agencies (CAAs)
	Income Qualified – Single Family	Whole-building low-to-moderate income program, including direct install and shell measures for single family homes
	Income Qualified – Multifamily	Whole-building low-to-moderate income program, including direct install and shell measures for multifamily facilities
	Income Qualified – Smart Savers	Program directly providing advanced thermostats to low-income customers
	Public Housing	Public housing program providing energy efficiency measures to public housing facilities
	Heating and Cooling (HVAC)	HVAC program offering instant or mail-in rebates on energy efficient heating and cooling equipment
	Behavioral Modification	Home energy reports program targeting both electric and gas customers
	Appliance Recycling	Refrigerator and freezer recycling program
	Multifamily	Market-rate multifamily program providing direct install measures
	Direct Distribution of Efficient Products (Direct Distribution)	Program providing energy efficiency kits through a variety of channels (K-12 education, kits distributed to Appliance Recycling participants, kits distributed at community events)
Business	Standard	Non-residential prescriptive incentive program, also including small business direct install, midstream lighting, and online store components
	Custom	Non-residential custom incentive program providing incentives for more complex non-residential projects
	Retro-Commissioning (RCx)	Non-residential retro-commissioning program including compressed air and industrial refrigeration components in addition to more traditional whole-building RCx measures
	Streetlighting	Program incentivizing municipalities to upgrade municipality- or AIC-owned streetlighting to LED technology
	Building Operator Certification (BOC)	Training program focused on energy-efficient building operations and preventative maintenance procedures
Voltage Optimization		Energy efficiency technology implemented by AIC at the distribution substation or circuit level that optimizes voltage levels along distribution circuits to reduce energy usage

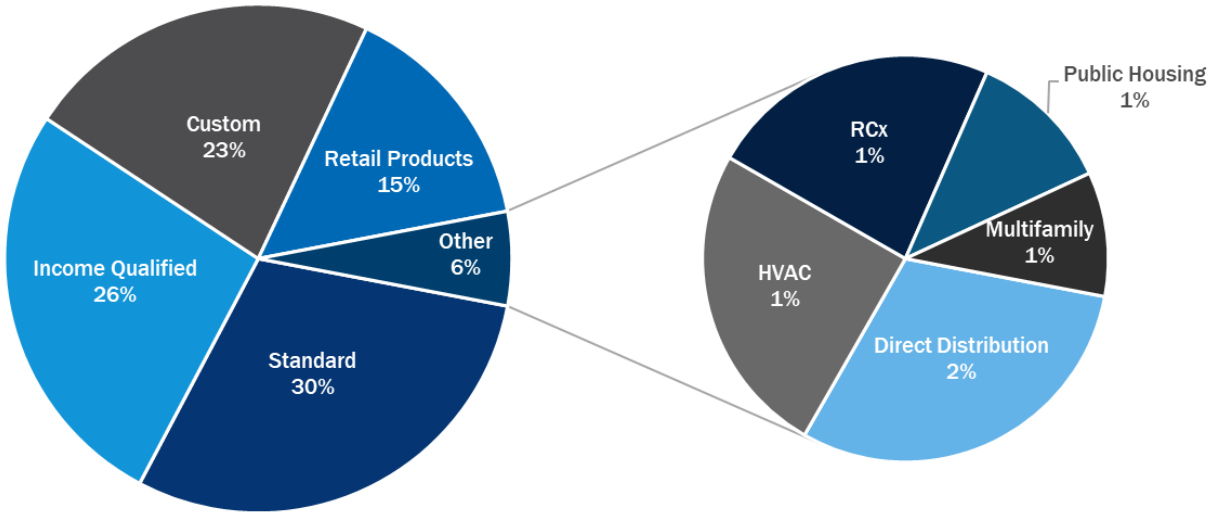
The portfolio's savings are driven heavily by a small number of initiatives. The Business Program's Standard Initiative and the Residential Program's Retail Products Initiative together provide over 75% of portfolio verified net energy savings.[3] Figure 1 shows portfolio verified net electric energy savings by initiative.

Figure 1. 2019 AIC Portfolio Verified Net Electric Energy Savings by Initiative



Gas savings are somewhat more diversified across initiatives. Four initiatives (Business Standard and Custom, as well as Residential Income Qualified and Retail Products) each provide 15% of portfolio gas savings or more. Figure 2 shows portfolio verified net gas savings by initiative.[4]

Figure 2. 2019 AIC Portfolio Ex Ante Gas Savings by Initiative



[3] Excluding the conversion of alternate fuels to MWh for goal attainment, residential NPSO, and Building Operator Certification.
[4] Excluding the conversion of alternate fuels to MWh for goal attainment, residential NPSO, and Building Operator Certification.

3. Evaluation Approach

The following section of the report describes the evaluation approach taken for the impact evaluation of the 2019 AIC portfolio. As part of the evaluation process, the evaluation team applied versions of the Illinois Energy Efficiency Policy Manual and the Illinois Technical Reference Manual (IL-TRM) applicable to the 2019 program year (Version 1.1 and Version 7.0, respectively) wherever relevant.[5]

3.1 Research Objectives

The overarching research objectives for the impact evaluation of AIC's 2019 energy efficiency programs are as follows:

- What were the estimated gross energy and demand impacts from these programs?
- What were the estimated net energy and demand impacts from these programs?

The evaluation team met these objectives by conducting the impact evaluation activities outlined in Table 5.

Table 5. 2019 Impact Evaluation Activities

Initiative	Gross Impacts			Net Impacts	
	IL-TRM Application Review	Engineering Desk Reviews	On-Site M&V	Statistical Analysis	Application of SAG-Approved NTGRs
Retail Products	✓				✓
Income Qualified	✓				✓
Public Housing	✓				✓
Behavior Modification	✓			✓	
HVAC	✓				✓
Appliance Recycling	✓				✓
Multifamily	✓				✓
Direct Distribution	✓				✓
Standard	✓	✓			✓
Custom		✓		✓	✓
Retro-Commissioning		✓			✓
Streetlighting	✓				✓
Building Operator Certification	✓	✓			
Voltage Optimization				✓	

The following sections provide further detail on the gross and net impact evaluation activities.

[5] In future years, the evaluation team will apply updated versions of these manuals to the evaluation of this program as required by law, ICC orders and changes to the manuals themselves.

3.2 Verified Gross Impact Analysis Approach

3.2.1 Application of IL-TRM V7.0

To determine verified gross impacts associated with the majority of measures delivered through the 2019 AIC portfolio, we reviewed the content of initiative tracking databases to identify database errors and duplicate records, and to ensure that the implementer correctly applied savings algorithms and assumptions stated in the IL-TRM V7.0 and the IL-TRM V7.0 errata document. In particular, we applied the algorithms and assumptions provided in the IL-TRM V7.0, while using project-specific data from the initiative tracking databases where appropriate. As part of this process, we also verified measure installations through analysis of initiative tracking databases, as well as through the review of supporting project documentation.

We resolved any discrepancies found in the databases and provide details related to any gross savings adjustments in the initiative-specific sections of this report.

3.2.2 Application of Custom Impact Methods

The Voltage Optimization Program as well as the Behavioral Modification, Custom, Retro-Commissioning, and BOC initiatives are not suitable for gross impact analysis using the IL-TRM. These programs and initiatives require custom energy savings calculations to determine some or all gross impacts.[6] In addition, for a small number of measures provided through the Standard Initiative during 2019, we conducted engineering desk reviews to determine savings if the measure was not currently included in the IL-TRM. Further details around the custom impact methods applied for these initiatives are presented in the 2019 Residential Program, Business Program, and Voltage Optimization impact evaluation reports.

3.3 Verified Net Impact Analysis Approach

To determine verified net savings for the 2019 AIC Portfolio, we primarily applied SAG-approved net-to-gross ratios (NTGRs) to verified gross savings. There are three exceptions to this approach.

- One exception to this approach is the Behavioral Modification Initiative, which is implemented as a randomized controlled trial (RCT) and is evaluated using a consumption analysis approach that directly estimates net savings.[7]
- In addition, the evaluation team did not apply a NTGR to savings achieved from the installation of advanced thermostats. By SAG agreement, savings achieved by these measures are considered to be net and therefore not subject to adjustment with an NTGR.

[6] Note that in most cases, we applied IL-TRM assumptions and measure characterizations for evaluation of Building Operator Certification in accordance with evaluation best practice.
[7] Further details around the methods employed for the evaluation of this initiative are presented in the final 2019 Residential Program Impact Evaluation Report

3.4 Sources and Mitigation of Error

The evaluation team took steps to mitigate potential sources of error throughout the planning and implementation of the 2019 evaluation. In particular, we took the following actions to address potential sources of error.

- **Analysis Error:**
  - **Prescriptive Gross Impact Calculations:** For prescriptive gross impact calculations, we applied IL-TRM V7.0 calculations to the participant data in the tracking database to calculate gross impacts. To minimize data analysis error, a separate team member reviewed all calculations to verify their accuracy.
  - **Custom Gross Impact Calculations:** We determined custom gross impacts using desk reviews and data collected during on-site M&V. To minimize data analysis errors, the evaluation team had all calculations reviewed by a separate team member to verify that calculations were performed accurately.
  - **Net Impact Calculations:** For net impact calculations, we applied SAG-approved NTGRs to estimated gross impacts to derive net impacts. To minimize analytical errors, all calculations were reviewed by a separate team member to verify their accuracy.
- **Sampling Error:**[8]
  - **Custom Impact Sample:** The evaluation team completed an impact review for 54 of 156 Custom projects achieving savings in 2019, drawing three waves of stratified samples separately for projects claiming electric and gas savings. For gross impact results, at the 90% confidence level, we achieved a relative precision of 14.4% for electric energy savings, 5.6% for electric demand savings, and 8.4% for gas savings.
  - **Retro-Commissioning Impact Sample:** The evaluation team completed desk reviews for a census (20) of Retro-Commissioning projects, completed a census of on-site visits for Large Facilities and Retro-Commissioning Lite projects, and drew a stratified sample of four Compressed Air projects for on-site M&V. For gross impact results for Compressed Air, at the 90% confidence level, we achieved a relative precision of 2.1% for electric energy savings and 0% (no adjustments made, and therefore no error) for electric demand savings. All gas projects received desk reviews and on-site M&V, and therefore there is no sampling error around gas impacts.
- **Non-Sampling Error:**
  - **Measurement Error:** To minimize data collection error during site visits, the evaluation team used trained engineers and technicians familiar with the equipment covered by the Custom, Retro-Commissioning, and BOC initiatives and the methods used to calculate the gross impacts.

For the Behavioral Modification Initiative, we also worked to address the following types of error:

- **Model Specification Error:** The most difficult type of modeling error, in terms of bias and the ability to mitigate it, is specification error. In this type of error, variables that predict model outcomes are included when they should not be or left out when they should be included, possibly producing biased estimates. The team addressed this type of error by using a fixed-effects model, which adjusts for constant differences from one household to the next using customer-specific intercepts.

[8] There is no sampling error or measurement error associated with any Residential Program evaluation activity because we did not conduct any sampling-based evaluation activities for the 2019 impact evaluation.

Over time, treatment and control groups in a randomized experiment can drift apart due to attrition, causing an imbalance between the groups that must be addressed in the model specification. When there is an imbalance in consumption, weather, or other factors between treatment and control groups, model specification error can become much more pronounced. For this reason, the team also included models that control for weather conditions to account for differences in temperatures experienced by treatment and control populations.

- **Measurement Errors:** Measurement error can come from variables such as weather data, which are commonly included in the billing analysis models. If an inefficient base temperature is chosen for calculating degree-days or if an incorrect climate zone weather station is chosen, the model results could be subject to measurement error. We addressed this type of error by very carefully choosing the closest weather station for each customer in the model. Specifying an incorrect time period (either pre-treatment or post-treatment) can also lead to measurement error. To the extent that the data received from the implementer are correct, this should not be a problem; however, little can be done if there is an error in the source data.
- **Multi-Collinearity:** This type of modeling error can both bias the model results and produce very large variances in the results. The team dealt with this type of error by using model diagnostics such as variance inflation factor (VIF), though the relatively simple models (i.e. ones with few independent variables) used in the impact analysis have essentially no chance of problems with multi-collinearity.
- **Heteroskedasticity:** This type of modeling error can result in imprecise model results due to variance changing across customers with different levels of consumption. The team addressed this type of error by using robust standard errors. Most statistical packages offer a robust standard error option and make conservative assumptions in calculating the errors, which has the effect of making significance tests conservative as well.
- **Serial Correlation**: This type of modeling error can result in imprecise model results (due to multiple observations being highly correlated within the customer). The team addressed this type of error by clustering the errors by customer and using robust error estimation.

4. 2019 Portfolio Verified Savings

Within the following sections, the evaluation team presents initiative-level detail on verified Annual Savings (annualized 2019 energy savings)

4.1 Savings Conversion

FEJA allows electric utilities that jointly offer an energy efficiency measure or program with a gas utility to fund said measures or programs if the gas utility discontinues doing so and to recover the cost of doing so. In this case, the electric utility is allowed to "convert" non-electric energy savings achieved through said measures or programs to electric savings for the purposes of goal attainment. The total amount of savings allowed to be converted is capped at a maximum of 10% of the utility's AAIG.

AIC met the above criteria in 2019 and chose to convert savings from the Residential Program's Income Qualified – Single Family Initiative and the Business Program's Custom Initiative. Per FEJA, AIC was capped at a total conversion of no more than 18,221 MWh (10% of AIC's 2019 AAIG of 182,214 MWh). Using the SAG-approved conversion factor of 29.3 kWh per therm, this equals 621,891 therms that could be converted to electric savings.

AIC identified five gas projects included in the Custom Initiative and a number of specific gas measures included in the Income Qualified – Single Family Initiative for conversion to the evaluation team. We determined that these measures accounted for 539,404 therms in verified net savings and included this conversion as a line item in Table 7, Table 9, Table 10, and Table 12 below. These conversions reach 87% of AIC's allowable cap, and therefore can be completed without reduction. AIC indicated that these projects and measures accounted for all eligible savings for conversion in 2019. Table 6 summarizes AIC's 2019 gas conversion.

Table 6. 2019 AIC Gas Conversion

Initiative	Therms Converted	MWh Equivalent
Income Qualified - Single Family	447,806	13,121
Custom	91,598	2,684
Total	**539,404**	**15,805**
Conversion Cap	621,891	18,221
% of Cap	87%	87%

4.2 2019 Residential Program Annual Savings

The 2019 Residential Program achieved 128,644 MWh, 20.28 MW, and 1,742,952 therms in verified net savings. These savings are reported after accounting for the FEJA-allowed "conversion" of gas savings to electric energy savings for the purpose of goal attainment. Table 7, Table 8, and Table 9 present ex ante gross, verified gross, and verified net electric energy, electric demand, and gas savings by initiative for the 2019 Residential Program.

Table 7. 2019 Residential Program Electric Energy Annual Savings Summary

Initiative/Channel	Ex Ante Gross MWh	Gross Realization Rate	Verified Gross MWh	Net-to-Gross Ratio (NTGR)	Verified Net MWh
Retail Products	109,992	104%	114,126.69	0.716	81,770
Income Qualified - CAA	955	85%	814.94	1.000	815
Income Qualified - Single Family	8,746	107%	9,332.50	1.000	9,332
Income Qualified - Multifamily	1,562	104%	1,629.97	1.000	1,630
Income Qualified - Smart Savers	3,059	92%	2,824.24	1.000	2,824
Public Housing	1,164	100%	1,161.78	1.000	1,162
Behavioral Modification	3,617	29%	1,060.96	N/A	1,061
HVAC	7,478	122%	9,129.85	0.755	6,890
Appliance Recycling	4,714	109%	5,147.49	0.541	2,786
Multifamily	1,335	107%	1,424.12	0.921	1,311
Direct Distribution - School Kits	2,007	100%	2,013.79	0.931	1,874
Direct Distribution – AR Kits	126	95%	120.17	1.000	120
Direct Distribution – Comm. Kits	980	100%	980.22	1.000	980
Residential Program Subtotal	*145,736*	*103%*	*149,766.73*	*0.752*	*112,557*
Residential NPSO Adder (3.1%)					2,966
Income Qualified - Single Family (gas conversion)					13,121
Residential Program Total					**128,644**

Table 8. 2019 Residential Program Electric Demand Annual Savings Summary

Initiative/Effort	Ex Ante Gross MW	Gross Realization Rate[a]	Verified Gross MW	NTGR	Verified Net MW
Retail Products	14.60	106%	15.48	0.729	11.29
Income Qualified - CAA	0.24	89%	0.22	1.000	0.22
Income Qualified - Single Family	2.84	107%	3.04	1.000	3.04
Income Qualified - Multifamily	0.19	124%	0.24	1.000	0.24
Income Qualified - Smart Savers	0.62	107%	0.66	1.000	0.66
Public Housing	0.17	108%	0.19	1.000	0.19
Behavioral Modification	N/A	N/A	0.18	N/A	0.18
HVAC	3.84	111%	4.27	0.741	3.16
Appliance Recycling	0.58	109%	0.63	0.540	0.34
Multifamily	0.15	135%	0.21	0.935	0.19
Direct Distribution - School Kits	0.28	101%	0.28	0.942	0.27
Direct Distribution – AR Kits	0.02	96%	0.02	1.000	0.02
Direct Distribution – Comm. Kits	0.13	113%	0.14	1.000	0.14
Residential Program Subtotal	*23.67*	*107%*	*25.56*	*0.778*	*19.94*
Residential NPSO Adder (3.1%)					0.48
Residential Program Total					**20.42**

Table 9. 2019 Residential Program Gas Annual Savings Summary

Initiative/Effort	Ex Ante Gross Therms	Gross Realization Rate[a]	Verified Gross Therms	NTGR	Verified Net Therms
Retail Products	739,243	95%	700,639	1.000	700,595
Income Qualified - CAA	89,141	102%	90,739	1.000	90,739
Income Qualified - Single Family	815,506	103%	837,672	1.000	837,672
Income Qualified - Multifamily	25,361	102%	25,743	1.000	25,743
Income Qualified - Smart Savers	300,262	95%	285,545	1.000	285,545
Public Housing	31,662	102%	32,181	1.000	32,181
Behavioral Modification	35,694	0%	0	N/A	0
HVAC	69,492	100%	69,775	1.000	69,775
Appliance Recycling	0	N/A	0	N/A	0
Multifamily	27,626	100%	27,650	0.998	27,604
Direct Distribution - School Kits	25,825	101%	25,965	1.000	25,965
Direct Distribution – AR Kits	5,724	100%	5,726	1.000	5,726
Direct Distribution – Comm. Kits	50,698	104%	52,959	1.000	52,959
Residential Program Subtotal	*2,216,235*	*97%*	*2,154,595*	*1.000*	*2,154,505*
Residential NPSO Adder (4.4%)					36,253
Income Qualified (gas conversion)					-447,806
Residential Program Total					**1,742,952**

4.3 2019 Business Program Annual Savings

The 2019 Business Program achieved 206,629 MWh, 33.25 MW, and 2,445,203 therms in verified net savings. Table 10, Table 11, and Table 12 present ex ante gross, verified gross, and verified net electric energy, electric demand, and gas savings by initiative for the 2019 Business Program.

Table 10. 2019 Business Program Electric Energy Annual Savings Summary

Initiative/Effort	Ex Ante Gross MWh	Gross Realization Rate	Verified Gross MWh	NTGR	Verified Net MWh
Standard	200,778	99%	199,497	0.866	172,771
Custom	27,130	101%	27,583	0.822	22,673
Retro-Commissioning	5,322	88%	4,680	0.890	4,165
Streetlighting	4,014	100%	4,014	1.000	4,014
Business Program Subtotal	*237,244*	*99%*	235,774	*0.863*	203,623
Custom (gas conversion)					2,684
BOC					322
Residential Program Total					**206,629**

Table 11. 2019 Business Program Electric Demand Annual Savings Summary

Initiative/Effort	Ex Ante Gross MW	Gross Realization Rate	Verified Gross MW	NTGR	Verified Net MW
Standard	33.89	101%	34.11	0.869	29.64

Initiative/Effort	Ex Ante Gross MW	Gross Realization Rate	Verified Gross MW	NTGR	Verified Net MW
Custom	4.32	92%	3.96	0.822	3.25
Retro-Commissioning	0.60	54%	0.33	0.890	0.29
Streetlighting	0.00	N/A	0.00	N/A	0.00
Business Program Subtotal	*38.81*	*99%*	*38.28*	*0.863*	*33.18*
BOC					0.06
Residential Program Total					33.25

Table 12. 2019 Business Program Gas Annual Savings Summary

Initiative/Effort	Ex Ante Gross Therms	Gross Realization Rate[a]	Verified Gross Therms	NTGR	Verified Net Therms
Standard	2,285,498	101%	2,316,720	0.600	1,390,792
Custom	1,487,000	76%	1,131,829	0.939	1,062,788
Retro-Commissioning	83,622	88%	73,197	0.890	65,145
Streetlighting	0	N/A	0	N/A	0
Business Program Subtotal	*3,856,120*	*91%*	*3,521,746*	*0.715*	*2,518,725*
Custom (gas conversion)					-91,598
BOC					18,076
Residential Program Total					**2,445,203**

4.4 2019 Voltage Optimization Program Annual Savings

The 2019 Voltage Optimization Program achieved 9,175 MWh and 0.817 MW in verified net savings. Table 13 presents ex ante gross, verified gross, and verified net savings for the 2019 Voltage Optimization Program.

Table 13. 2019 Voltage Optimization Program Annual Savings Summary

	Electric Energy Savings (MWh)	Electric Peak Demand Savings (MW)	Gas Savings (Therms)
Ex Ante Gross Savings	7,849	NA	NA
Gross Realization Rate	117%	NA	NA
Verified Gross Savings	9,175	0.817	NA
NTGR	1.00	1.00	NA
Verified Net Savings	9,175	0.817	NA

Appendix A. 2019 Detailed Verified Savings Results

Table 14 and Table 15 present detailed verified savings results for the 2019 AIC portfolio. Further detail is provided in the separately provided Excel workbook.

Table 14. 2019 AIC Portfolio Detailed Verified Savings Results - Electric

AIC 2019 Initiatives	Ex Ante Gross	Realization Rate	Verified Gross			Deemed / Used	Verified Net					Actual	Evaluation Estimate (Where Available)	Participation		Weighted Average Measure Life
	First Year Annual Energy Savings	Energy Savings (Ex Ante Gross / Verified Gross)	First Year Annual Energy Savings	First Year Peak Demand Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	First Year Peak Demand Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	Net-to-Gross Ratio	# Units	Units Definition	Years
	MWh	%	MWh	MW	MWh	%	MWh	MW	MWh	$/MWh	$/MWh	$	%			
Residential Program																
Retail Products	109,992	104%	114,127	15.48	585,677	0.716	81,770	11.22	419,631	$ 97.81	$ 19.06	$ 7,998,335	Various	2,655,061	Products rebated	9.1
Income Qualified - CAA	955	85%	815	0.22	10,188	1.000	815	0.22	10,188	$ 2,867.25	$ 229.35	$ 2,336,643	N/A	380	Homes served	14.9
Income Qualified - Single Family	8,746	107%	9,332	3.04	102,091	1.000	9,332	3.04	102,091	$ 2,098.21	$ 191.81	$ 19,581,546	N/A	4,157	Homes served	14.7
Income Qualified - Multifamily	1,562	104%	1,630	0.24	15,304	1.000	1,630	0.24	15,304	$ 564.96	$ 60.17	$ 920,870	N/A	1,108	Units treated	10.7
Income Qualified - Smart Savers	3,059	92%	2,824	0.66	31,067	1.000	2,824	0.66	31,067	$ 533.93	$ 48.54	$ 1,507,937	N/A	6,048	Advanced thermostats	11.0
Public Housing	1,164	100%	1,162	0.19	8,605	1.000	1,162	0.19	8,605	$ 818.83	$ 110.55	$ 951,306	N/A	90	Properties treated	10.4
Behavioral Modification	3,617	29%	1,061	0.18	2,700	1.000	1,061	0.18	2,700	$ 724.66	$ 284.80	$ 768,838	N/A	71,177	Customers treated	5.0
HVAC	7,478	122%	9,130	4.27	111,067	0.755	6,890	3.16	83,825	$ 529.89	$ 43.56	$ 3,651,198	No 2019 research	9,836	Measures rebated	16.5
Appliance Recycling	4,714	109%	5,147	0.63	38,606	0.541	2,786	0.34	20,894	$ 587.81	$ 78.37	$ 1,637,563	No 2019 research	5,422	Measures recycled	6.5
Multifamily	1,335	107%	1,424	0.21	13,049	0.921	1,311	0.19	12,015	$ 473.29	$ 51.65	$ 620,595	No 2019 research	916	Tenant units	10.3
Direct Distribution - School Kits	2,007	100%	2,014	0.28	13,525	0.931	1,874	0.27	12,586				No 2019 research	67,626	Measures distributed	8.8
Direct Distribution - Appliance Recycling	126	95%	120	0.02	793	1.000	120	0.02	793	$ 304.34	$ 46.14	$ 905,191	N/A	4,716	Measures distributed	8.9
Direct Distribution - Community Kits	980	100%	980	0.14	6,241	1.000	980	0.14	6,241				N/A	5,692	Kits distributed	9.1
Residential NPSO Adder	N/A	N/A	N/A	N/A	N/A	N/A	2,966	0.48	18,000	N/A	N/A	N/A	N/A	N/A	N/A	9.5
Business Program																
Standard	200,778	99%	199,497	34.11	2,586,243	0.835	172,771	29.64	2,158,753	$ 196.68	$ 15.74	$ 33,980,710	Various	7,403	Projects	13.3
Custom	27,130	102%	27,583	3.96	406,363	0.825	22,673	3.25	335,275	$ 275.42	$ 18.62	$ 6,244,475	No 2019 research	140	Projects	14.8
Retro-Commissioning	5,322	88%	4,680	0.33	24,271	0.914	4,165	0.29	22,183	$ 95.31	$ 17.90	$ 396,991	No 2019 research	20	Projects	5.3
Streetlighting	4,014	100%	4,014	0.00	42,647	1.000	4,014	0.00	42,647	$ 222.96	$ 20.99	$ 894,969	No 2019 research	50	Projects	12.0
Building Operator Certification	N/A	N/A	N/A	N/A	N/A	N/A	322	0.06	4,648	N/A	N/A	N/A	N/A	12	Customers trained	14.9
Portfolio Total	**382,980**	**101%**	**385,541**	**63.96**	**3,998,436**	**0.829**	**319,468**	**53.60**	**3,307,444**	**$ 295.37**	**$ 28.53**	**$ 94,361,558**				**12.0**

Notes

- Savings presented reflect actual savings achieved by the programs and do not reflect the Future Energy Jobs Act-allowed conversion of alternate fuels to MWh.
- If the conversion had been included, it would add an additional 13,121 in verified net MWh to the Income Qualified - Single Family Initiative and 2,684 MWh to the Custom Initiative as compared to the totals presented here.
- Program costs presented in the "Portfolio Total" row include unallocated portfolio-level administrative costs and therefore are in excess of the sums of the individual rows.

Table 15. 2019 AIC Portfolio Detailed Verified Savings Results - Gas

AIC 2019 Initiatives	Ex Ante Gross	Realization Rate	Verified Gross		Deemed / Used	Verified Net				Actual	Evaluation Estimate (Where Available)	Participation		Weighted Average Measure Life
	First Year Annual Energy Savings	Energy Savings (Ex Ante Gross / Verified Gross)	First Year Annual Energy Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	Net-to-Gross Ratio	# Units	Units Definition	Years
	Therms	%	Therms	Therms	%	Therms	Therms	$/Therm	$/Therm	$	%			
Residential Programs														
Retail Products	739,243	95%	700,639	7,707,383	1.000	700,595	7,706,899	$ 1.50	$ 0.14	$ 1,050,556	Various	16,221	Products rebated	11.0
Income Qualified - CAA	89,141	102%	90,739	1,734,753	1.000	90,739	1,734,753	$ 8.49	$ 0.44	$ 770,685	N/A	380	Homes served	19.1
Income Qualified - Single Family	815,506	103%	837,672	14,179,498	1.000	837,672	14,179,498	$ 6.40	$ 0.38	$ 5,364,468	N/A	4,157	Homes served	16.9
Income Qualified - Multifamily	25,361	102%	25,743	278,069	1.000	25,743	278,069	$ 4.65	$ 0.43	$ 119,820	N/A	1,108	Units treated	10.8
Income Qualified - Smart Savers	300,262	95%	285,545	3,140,994	1.000	285,545	3,140,994	$ 3.59	$ 0.33	$ 1,024,507	N/A	6,048	Advanced thermostats	11.0
Public Housing	31,662	102%	32,181	370,206	1.000	32,181	370,206	$ 4.16	$ 0.36	$ 133,736	N/A	90	Properties treated	11.5
Behavioral Modification	35,694	0%	-	-	N/A	-	-	N/A	N/A	$ 43,682	N/A	71,047	Customers treated	5.0
HVAC	69,492	100%	69,775	767,525	1.000	69,775	767,525	$ 2.02	$ 0.18	$ 141,252	No 2019 research	1,393	Advanced thermostats	11.0
Appliance Recycling	-	N/A	-	-	N/A	-	N/A	N/A	N/A	$ -	No 2019 research	N/A	N/A	N/A
Multifamily	27,626	100%	27,650	304,477	0.998	27,604	303,973	$ 3.44	$ 0.31	$ 95,012	No 2019 research	916	Units treated	11.0
Direct Distribution - School Kits	25,825	101%	25,965	240,878	1.000	25,965	240,878				No 2019 research	67,626	Measures distributed	9.3
Direct Distribution - Appliance Recycling	5,724	100%	5,726	56,003	1.000	5,726	56,003	$ 43,215.98	$ 0.16	$ 129,648	No 2019 research	4,716	Measures distributed	9.8
Direct Distribution - Community Kits	50,698	104%	52,959	511,048	1.000	52,959	511,048				No 2019 research	5,692	Kits distributed	9.6
Residential NPSO Adder	N/A	N/A	N/A	N/A	N/A	36,253	492,849	N/A	N/A	N/A	N/A	N/A	N/A	13.6
Business Programs														
Standard	2,285,498	101%	2,316,720	25,485,089	0.600	1,390,792	10,303,330	$ 1.12	$ 0.15	$ 1,557,224	Various	739	Projects	7.4
Custom	1,487,000	76%	1,131,829	12,450,692	0.939	1,062,788	12,814,845	$ 2.18	$ 0.18	$ 2,315,710	No 2019 research	34	Projects	12.1
Retro-Commissioning	83,622	88%	73,197	805,206	0.890	65,145	488,591	$ 3.88	$ 0.52	$ 252,507	No 2019 research	3	Projects	7.5
Streetlighting	-	N/A	-	-	N/A	-	N.A.	N/A	N/A	$ -	No 2019 research	0	Projects	N/A
Building Operator Certification	N/A	N/A	N/A	N/A	N/A	18,076	N.A.	$ 228.23	N/A	$ 4,125,442	N/A	12	Customers trained	N/A
Portfolio Total	**6,072,355**	**93%**	**5,676,341**	**68,031,820**	**0.833**	**4,727,559**	**53,389,462**	**$ 43,484.14**	**$ 3.45**	**$ 14,415,807**				**10.7**

Notes

- Savings presented reflect actual savings achieved by the programs and do not reflect the Future Energy Jobs Act-allowed conversion of alternate fuels to MWh.
- If the conversion had been included, it would subtract 447,806 in verified net therms from the Income Qualified - Single Family Initiative and 91,598 in verified net therms from the Custom Initiative, for a total of -539,404 in verified net therm savings as compared to the totals presented here.
- Program costs presented in the "Portfolio Total" row include unallocated portfolio-level administrative costs and therefore are in excess of the sums of the individual rows.

Appendix B. 2019 High Impact Measure List

These results are forthcoming with the 2019 AIC Cost-Effectiveness Report.

Appendix C. 2019 Program Evaluation Reports

The 2019 Residential Program, Business Program, and Voltage Optimization Impact Evaluation Reports are available on the Illinois Stakeholder Advisory Group website: (http://www.ilsag.info/draft_evaluation_reports.html).

Appendix D. Cumulative Persisting Annual Savings.

This appendix presents detailed CPAS for the AIC portfolio by initiative. Due to many years of CPAS, tables are challenging to read; please reference the separately provided CPAS spreadsheet for additional detail as needed.

Table 16 provides CPAS for the 2019 AIC portfolio through 2047 at the initiative level. Lifetime savings for the 2019 AIC portfolio are 3,672,299 MWh.

Cumulative Persisting Annual Savings.

Table 16. 2019 AIC Portfolio CPAS and WAML

Initiative	Initiative-Level WAML	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net MWh														
				2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Retail Products	9.1	114,126.69	0.716		81,770	81,770	49,955	49,955	46,504	23,567	23,567	18,659	18,659	18,659	6,467	24	24	24
IQ - CAA	14.9	814.94	1.000		815	815	555	555	555	555	555	553	553	553	436	415	415	415
IQ - SF	14.7	9,332.50	1.000		9,332	9,332	7,809	7,809	7,809	7,305	5,646	5,272	5,272	5,272	4,392	3,819	3,819	3,819
IQ - MF	10.7	1,629.97	1.000		1,630	1,630	1,460	1,460	1,460	1,303	1,296	1,199	1,199	1,198	962	127	127	127
IQ - Smart Savers	11.0	2,824.24	1.000		2,824	2,824	2,824	2,824	2,824	2,824	2,824	2,824	2,824	2,824	2,824	0	0	0
IQ - SF (gas conversion)	18.5	13,120.73	1.000		13,121	13,121	13,121	13,121	13,121	13,121	9,477	9,477	9,439	9,439	8,912	6,997	6,997	6,997
Public Housing	10.4	1,161.78	1.000		1,162	1,162	768	768	768	672	672	577	551	534	141	92	93	93
Behavior Modification	5.0	1,060.96	1.000		1,061	783	484	257	115	0	0	0	0	0	0	0	0	0
HVAC	16.5	9,129.85	0.755		6,890	6,890	6,890	6,890	6,890	6,890	4,443	4,443	4,443	4,443	4,443	3,954	3,954	3,954
Appliance Recycling	6.5	5,146.77	0.541		2,786	2,786	2,786	2,786	2,786	2,786	2,786	1,393	0	0	0	0	0	0
Multifamily	10.3	1,424.12	0.921		1,311	1,311	1,141	1,141	1,141	1,059	1,059	1,015	984	964	885	3	0	0
DD - School Kits	8.8	2,013.79	0.931		1,874	1,874	1,340	1,340	1,340	1,340	1,340	806	806	525	0	0	0	0
DD - Appliance Recycling Kits	8.9	120.17	1.000		120	120	85	85	85	85	85	48	48	33	0	0	0	0
DD - Community Kits	9.1	980.22	1.000		980	980	642	641	641	641	641	357	356	356	0	0	0	0
Residential NPSO	9.5	4,119.97	N/A		2,966	3,068	2,025	2,018	1,907	1,185	1,109	883	838	829	409	140	140	140
Standard	13.3	199,497	0.866		172,771	172,741	171,413	168,630	165,691	162,382	160,569	159,154	156,652	154,782	151,446	122,623	85,659	80,713
Custom	14.8	27,583	0.822		22,673	22,673	22,618	22,517	22,486	22,486	22,201	22,136	22,010	21,832	21,646	19,644	17,870	14,387
Custom (gas conversion)	14.4	2,858	0.939		2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,684	2,586	2,416
Retro-Commissioning	5.3	4,680	0.890		4,165	4,159	3,946	3,909	3,784	888	888	444	0	0	0	0	0	0
Streetlighting	12.0	4,014	1.000		4,014	4,014	4,014	4,014	3,324	3,324	3,324	3,324	3,324	3,324	3,324	3,324	0	0
Building Operator Certification	14.9	322	N/A		322	322	322	318	318	315	315	315	304	304	304	303	303	303
Voltage Optimization	15.0	9,175	N/A		9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175	9,175
2019 Portfolio CPAS		**415,135**	**0.830**		**344,447**	**344,234**	**306,057**	**302,895**	**295,406**	**264,586**	**254,656**	**244,736**	**240,120**	**237,729**	**218,451**	**173,322**	**131,160**	**122,560**
Expiring 2019 Portfolio CPAS					**0**	**213**	**38,178**	**3,162**	**7,489**	**30,820**	**9,930**	**9,920**	**4,616**	**2,391**	**19,278**	**45,128**	**42,162**	**8,600**
Expired 2019 Portfolio CPAS					**0**	**213**	**38,391**	**41,552**	**49,041**	**79,861**	**89,791**	**99,711**	**104,327**	**106,718**	**125,997**	**171,125**	**213,287**	**221,887**

Initiative	Initiative-Level WAML	First-Year Verified Gross MWh	NTGR	CPAS - Verified Net MWh														
				2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047
Retail Products	9.1	114,126.69	0.716	11	11	4	0	0	0	0	0	0	0	0	0	0	0	0
IQ - CAA	14.9	814.94	1.000	415	415	415	415	415	371	0	0	0	0	0	0	0	0	0
IQ - SF	14.7	9,332.50	1.000	3,819	3,148	2,401	2,401	2,008	1,608	0	0	0	0	0	0	0	0	0
IQ - MF	10.7	1,629.97	1.000	127	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IQ - Smart Savers	11.0	2,824.24	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IQ - SF (gas conversion)	18.5	13,120.73	1.000	6,997	6,953	6,953	6,953	6,953	7,187	34	34	34	34	34	0	0	0	0
Public Housing	10.4	1,161.78	1.000	93	93	93	93	93	93	0	0	0	0	0	0	0	0	0
Behavior Modification	5.0	1,060.96	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
HVAC	16.5	9,129.85	0.755	3,954	2,078	1,187	1,187	0	0	0	0	0	0	0	0	0	0	0
Appliance Recycling	6.5	5,146.77	0.541	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Multifamily	10.3	1,424.12	0.921	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DD - School Kits	8.8	2,013.79	0.931	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DD - Appliance Recycling Kits	8.9	120.17	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DD - Community Kits	9.1	980.22	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Residential NPSO	9.5	4,119.97	N/A	140	78	50	50	13	12	0	0	0	0	0	0	0	0	0
Standard	13.3	199,497	0.866	69,991	802	433	385	385	385	382	382	382	0	0	0	0	0	0
Custom	14.8	27,583	0.822	12,199	8,078	4,764	3,304	1,714	1,714	1,712	1,676	1,249	885	699	53	49	0	0
Custom (gas conversion)	14.4	2,858	0.939	1,401	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retro-Commissioning	5.3	4,680	0.890	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Streetlighting	12.0	4,014	1.000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Building Operator Certification	14.9	322	N/A	281	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Voltage Optimization	15.0	9,175	N/A	9,175	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019 Portfolio CPAS		**415,135**	**0.830**	**108,603**	**21,659**	**16,299**	**14,788**	**11,581**	**11,370**	**2,128**	**2,092**	**1,666**	**919**	**733**	**53**	**49**	**0**	**0**
Expiring 2019 Portfolio CPAS				**13,957**	**86,944**	**5,359**	**1,511**	**3,207**	**212**	**9,242**	**36**	**427**	**746**	**186**	**681**	**4**	**49**	**0**
Expired 2019 Portfolio CPAS				**235,845**	**322,789**	**328,148**	**329,659**	**332,866**	**333,078**	**342,319**	**342,355**	**342,782**	**343,528**	**343,714**	**344,395**	**344,398**	**344,447**	**344,447**
2019 Portfolio WAML	**12.2**																	

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