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Ameren Illinois Company 2019 Energy Efficiency Portfolio Cost-Effectiveness Results

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1. Executive Summary

This report presents the results of cost-effectiveness testing conducted for Ameren Illinois Company (AIC)'s portfolio of energy efficiency programs implemented during 2019.

1.1 Background

Illinois state law (220 ILCS 5/8-103B ["Section 8-103B"] and 220 ILCS 5/8-104 ["Section 8-104"]) directs utilities to operate cost-effective energy efficiency programs, and to demonstrate that their energy efficiency portfolios are cost-effective using the Illinois Total Resource Cost (TRC) test. In accordance with law, relevant Illinois Commerce Commission (ICC) orders, and policy developed by the Illinois Stakeholder Advisory Group (SAG), Opinion Dynamics conducted cost-effectiveness testing for AIC's 2019 portfolio of energy efficiency programs. Cost-effectiveness testing for the Illinois TRC presented in this report aligns with national standard practice, as well as directives presented in the Illinois Energy Efficiency Policy Manual Version 1.1,[1] and incorporates information from AIC program tracking data, Opinion Dynamics' 2019 evaluations of AIC's portfolio, and supporting information from the Illinois TRM (IL-TRM).

1.2 2019 Cost-Effectiveness Results

Opinion Dynamics used two separate tests to establish benefit-cost ratios for AIC's 2019 portfolio: the Illinois TRC test and the Program Administrator Cost (PAC) test. The tests are similar in most respects but consider slightly different benefits and costs in determining a benefit/cost ratio.

Illinois state legislation directs that cost-effectiveness testing for investment in energy efficiency or demand response should be conducted using the Illinois TRC test. The Illinois TRC considers the net present value of the total benefits of energy efficiency programs as compared to the total costs of energy efficiency programs. The Illinois TRC takes a broad perspective, considering the net benefits that accrue to utilities and to program participants from operation of the programs, and uses a societal discount rate to account for the time value of money.

Additionally, Illinois stakeholders have requested that cost-effectiveness testing also use the PAC test to provide additional context for directing future energy efficiency investments. The PAC analyzes the costs and benefits of energy efficiency investment from the perspective of AIC and does not consider benefits or costs that accrue only to participants in energy efficiency programs.

We report cost-effectiveness results separately for AIC's 2019 Residential and Business Programs and for AIC's 2019 Voltage Optimization Program. The programs are funded through separate mechanisms and track spending separately, and therefore separate cost-effectiveness results were deemed appropriate by the evaluation team. For clarity, throughout this report, when we refer to "AIC's 2019 energy efficiency portfolio," we are referencing AIC's 2019 portfolio less Voltage Optimization.[2]

[1] Broadly speaking, Version 1.1 of the Policy Manual was in effect during these evaluations. However, the evaluation report voluntarily applies policies from Section 8 of Policy Manual 2.0. Despite these policies not being formally in effect for the program year being evaluated, they were applied given informal agreement to do so and their absence from Version 1.1.

[2] We note that this terminology is not exactly accurate; the Illinois Policy Manual defines voltage optimization as energy efficiency. Nevertheless, we use this terminology for convenience.

Overall, AIC's 2019 energy efficiency portfolio was cost-effective as defined by the Illinois TRC test and the PAC test. Table 1 provides the Illinois TRC and PAC test benefit-cost ratios, calculated for the energy efficiency portfolio, the Residential and Business Programs, and the initiatives that compose them.

Table 1. Illinois TRC and PAC Test Results for the 2019 AIC Energy Efficiency Portfolio

Program	Initiative	Illinois TRC Benefit-Cost Ratio	PAC Benefit-Cost Ratio
Residential	Retail Products	*5.66*	*3.27*
Residential	Income Qualified - Single Family	*1.27*	*0.65*
Residential	Income Qualified - CAA	*0.47*	*0.61*
Residential	Income Qualified - Multifamily	*2.28*	*1.10*
Residential	Income Qualified - Smart Savers	*3.50*	*1.69*
Residential	Public Housing	*1.69*	*0.70*
Residential	Behavioral Modification	*0.29*	*0.24*
Residential	HVAC	*4.54*	*2.46*
Residential	Appliance Recycling	*0.84*	*0.73*
Residential	Multifamily	*1.92*	*1.35*
Residential	Direct Distribution	*8.46*	*1.92*
Residential Program Total[a]		*2.60*	*1.39*
Business	Standard	*2.27*	*4.08*
Business	Custom	*2.64*	*3.31*
Business	Retro-Commissioning	*2.10*	*2.43*
Business	Streetlighting	*2.58*	*2.15*
Business Program Total		*2.32*	*3.88*
2019 AIC Energy Efficiency Portfolio[b]		**2.19**	**2.22**

[a] The Residential Program benefit-cost ratios also include non-participant spillover benefits.

[b] The Portfolio-level benefit cost ratios include the costs and benefits generated through the Building Operator Certification Initiative. This initiative is included in AIC's Business Program, but the costs and benefits are only included at the portfolio level because the costs for this initiative are included under portfolio administration costs and cannot be disaggregated. Therefore, the costs and benefits for this initiative could not be incorporated into the Business Program benefit cost ratio in a balanced manner.

AIC's 2019 Voltage Optimization Program was also cost-effective as defined by the Illinois TRC test and the PAC test. Table 2 provides the Illinois TRC and PAC test benefit-cost ratios calculated for the Program.

Table 2. Illinois TRC and PAC Test Results for the 2019 AIC Voltage Optimization Program

Program	Illinois TRC Benefit-Cost Ratio	PAC Benefit-Cost Ratio
Voltage Optimization	4.76	3.54

2. Background

Opinion Dynamics analyzed the cost-effectiveness of Ameren Illinois Company (AIC)'s 2019 energy efficiency portfolio and Voltage Optimization Program using the Illinois Total Resource Cost (TRC) test and the Program Administrator Cost (PAC) test. Illinois state legislation directs that cost-effectiveness testing for investment in energy efficiency or demand response should be conducted using the Illinois TRC test. Additionally, Illinois stakeholders have requested that cost-effectiveness testing also use the PAC test to provide additional context for directing future energy efficiency investments. The combination of the TRC and PAC test values provides useful context to direct future investments.

As defined by Illinois state law (220 ILCS 5/8-103B ["Section 8-103B"]) and presented in the Illinois Energy Efficiency Policy Manual Version 1.1 ("the Illinois Policy Manual"), the definition of the Illinois TRC test for electric energy efficiency is as follows:

> *"Total resource cost test" or "TRC test" means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided electric utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures and including avoided costs associated with reduced use of natural gas or other fuels, avoided costs associated with reduced water consumption, and avoided costs associated with reduced operation and maintenance costs, as well as other quantifiable societal benefits, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of power and energy that an electric utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases. In discounting future societal costs and benefits for the purpose of calculating net present values, a societal discount rate based on actual, long-term Treasury bond yields should be used. Notwithstanding anything to the contrary, the TRC test shall not include or take into account a calculation of market price suppression effects or demand reduction induced price effects.*[3]

Illinois state law (220 ILCS 5/8-104 ["Section 8-104"]) also defines the Illinois TRC for natural gas energy efficiency:

> *"Cost-effective" means that the measures satisfy the total resource cost test which, for purposes of this Section, means a standard that is met if, for an investment in energy efficiency, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the measures to the net present value of the total costs as calculated over the lifetime of the measures. The total resource cost test compares the sum of avoided natural gas utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, as well as other quantifiable societal benefits, including avoided electric utility costs, to the sum of all incremental costs of end use measures (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side measure, to quantify the net savings obtained by substituting demand-side measures for supply resources. In calculating avoided costs, reasonable estimates shall be included for financial costs likely to be imposed by future*

[3] 20 ILCS 3855/1-10.

> *regulation of emissions of greenhouse gases. The low-income programs described in item (4) of subsection (f) of this Section shall not be required to meet the total resource cost test.*

As directed by state law, our analysis includes reasonable estimates of the avoided costs associated with the portfolio that relate to future regulation of greenhouse gas emissions. Additionally, as directed by the legislation, we utilized a societal discount rate to calculate the future societal costs and benefits delivered by the programs.

It is valuable for readers to note that the Illinois TRC test exhibits differences from tests referred to as "TRC" conducted in other jurisdictions. In particular, the Illinois TRC's directive to use a societal discount rate differs from the specification of the test in many other jurisdictions. The Illinois TRC also includes non-energy impacts, such as avoided operation and maintenance (O&M) costs, avoided water costs, and avoided costs associated with greenhouse gas emissions.

3. Cost-Effectiveness Evaluation Methods

Opinion Dynamics used program data provided by AIC along with the 2019 impact evaluation results to develop the cost-effectiveness analyses at the measure level, using a proprietary Opinion Dynamics tool. These results were then rolled up to produce Illinois TRC and PAC benefit-cost ratios at the initiative, program, and energy efficiency portfolio level. A detailed summary of the benefits and costs associated with each initiative and the broader energy efficiency portfolio is provided in Appendix A to this report.

Illinois state law requires AIC's portfolio to be cost-effective at the portfolio level (not including low-income programs) but individual programs, initiatives, or measures are not required to be cost-effective. Nevertheless, our analysis provides program- and initiative-level benefit-cost ratios to provide further insight for program planning. In addition, our analysis complies with all Illinois-specific guidance, including the Illinois TRC provisions and definitions of costs included in the Illinois Policy Manual. Table 3 provides high-level detail on the inputs used in the cost-effectiveness analysis, as well as the sources of these inputs.

Table 3. Inputs and Sources for Cost-Effectiveness Analysis

Category	Input	Source
Program-specific inputs	▪ Net electric energy savings (including heating penalties and secondary savings)[a] ▪ Net electric demand savings[a] ▪ Net natural gas energy savings (including heating penalties)[a] ▪ Measure counts	Opinion Dynamics evaluation of the 2019 AIC portfolio
	▪ Incremental measure costs ▪ Operations and maintenance costs ▪ Water savings (gallons)	Opinion Dynamics analysis using Illinois TRM
	▪ Incentive costs ▪ Non-incentive costs	AIC
Portfolio inputs	▪ Portfolio administrative, Breakthrough Equipment and Devices, marketing, and evaluation, measurement, and verification costs	AIC
	▪ Net electric energy savings (including heating penalties and secondary savings) from residential nonparticipant spillover (NPSO) and the Building Operator Certification (BOC) Initiative[a] ▪ Net electric demand savings from residential NPSO and the BOC Initiative[a] ▪ Net natural gas energy savings (including heating penalties) from residential NPSO and the BOC Initiative[a]	Opinion Dynamics evaluation of the 2019 AIC portfolio
Assumptions	▪ Avoided costs of electric production ▪ Avoided costs of electric capacity ▪ Avoided costs of natural gas production ▪ Avoided costs of water ▪ Avoided costs of greenhouse gas emissions ▪ Line losses ▪ Discount rate	AIC

[a] All net savings include temporal elements (including measure lives, baseline shifts, etc.) per the Illinois persisting savings framework.

To assess cost-effectiveness, the team began with a valuation of each program's and the portfolio's net total benefits and costs, discussed in more detail in Sections 3.1 and 3.2.

3.1 Portfolio Benefits Considered

As directed in Illinois, our analysis included benefits associated with the 2019 AIC portfolio. These benefits are made up of a number of avoided costs, which are costs no longer incurred due to the energy efficiency programs under evaluation. Our analysis included avoided costs as defined in Table 4.

Table 4. Portfolio Benefits Considered

Benefit	Definition	Included In	
		Illinois TRC	PAC
Avoided cost of electric energy (electric production)	Dollars per net kWh saved	✓	✓
Avoided cost of demand for electricity (electric capacity)	Dollars per net kW saved	✓	✓
Avoided cost of natural gas energy (gas production)	Dollars per net therm saved	✓	✓
Avoided line losses (transmission and distribution [T&D] costs)	Percentage of energy lost during T&D applied to net savings	✓	✓
Avoided O&M costs	Net dollars saved	✓	
Avoided cost of water	Dollars per net gallon of water saved	✓	
Avoided costs of greenhouse gas emissions	Dollars per net kWh saved	✓	

Opinion Dynamics developed estimates of units of energy and water saved over time, as well as dollar estimates of avoided O&M costs. AIC provided avoided cost schedules, line loss factors, and a societal discount rate assumption, which were used to convert units of energy and water saved over time to a net present value (NPV) of total avoided costs in dollars.

All benefits listed above are included in the Illinois TRC test. The avoided cost of water and avoided O&M costs are participant benefits only and are excluded from calculation of the PAC test. Avoided costs of greenhouse gas emissions are a societal benefit explicitly defined for consideration in the Illinois TRC and are also excluded from calculation of the PAC test.

3.2 Portfolio Costs Considered

Our analysis also considered costs associated with the operation of the portfolio. The costs considered fall into four categories as defined in Table 5, and are in alignment with cost definitions from the Illinois Policy Manual.

Table 5. Portfolio Costs Considered

Cost	Definition	Included In	
		Illinois TRC	PAC
Net incremental measure costs	▪ Incremental expenses associated with the installation of energy efficiency measures, including both customer- and utility- side costs ▪ For cost-effectiveness analysis, net-to-gross ratios (NTGRs) are applied to incremental costs to ensure that only net incremental costs are considered in the analysis.	✓	✓
Administrative costs associated with individual initiatives	AIC incurs administrative costs to operate energy efficiency programs; this category includes non-incentive costs associated with operation of individual initiatives	✓	✓

Cost	Definition	Included In	
		Illinois TRC	PAC
Portfolio Administration	AIC incurs administrative costs to operate energy efficiency programs; this category includes non-incentive costs associated with operation of the portfolio overall, including administrative expenses, marketing and education, Breakthrough Equipment and Devices (BED), and evaluation, measurement and verification (EM&V)	✓	✓
Prior- or Future-Year Costs	Each year AIC incurs implementation costs that are not associated with the current program year (i.e. in 2019, AIC incurs costs associated with the 2018 and 2020 portfolios). Implementation costs not associated with the current program year are captured in this category. The majority of these costs for prior years, and all costs for future years, relate to EM&V activities (e.g. development of evaluation plans for 2020 during 2019).	✓	✓
Incentive costs	Financial incentives paid to customers and incentives paid to third parties (as defined by the Illinois Policy Manual)		✓

All costs listed above are included in the PAC test. Incentive costs are not included in calculation of the Illinois TRC test to prevent double-counting.[4]

3.2.1 Incremental Costs

As defined in the Illinois Policy Manual, "incremental costs" are the difference between the cost of the efficient measure and the cost of the most relevant baseline measure that would have been installed in the absence of an energy efficiency program. The Illinois Policy Manual directs those conducting cost-effectiveness testing to consider installation costs and O&M costs in calculation of incremental costs if there is a difference between the baseline and efficient measures. However, in accordance with further policy manual guidance to consider avoided O&M costs as a benefit in some cases, we do not include avoided O&M costs in incremental costs as part of this analysis but break them out separately for consideration.

Opinion Dynamics generally used the Illinois TRM to define gross incremental costs in the 2019 cost-effectiveness analysis. In some cases, prescriptive incremental costs are not provided in the Illinois TRM. In those cases, discussed in more detail below, we treated measures as retrofits. The assumed baseline expenditure in these cases is $0, and therefore, the incremental cost for these cases is the full cost of the energy efficient improvement as provided by AIC.

As directed by the Illinois Policy Manual, we then applied net-to-gross ratios (NTGRs) to ensure that only net incremental costs were considered in our analysis. Table 6 provides additional detail on the source of incremental costs used in our analysis.

Table 6. Incremental Cost Source Detail

Program	Initiative	Incremental Cost Source
Residential Program	Retail Products	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0. Carryover measures used assumptions from the applicable version of the TRM.
	Income Qualified	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0 for the majority of measures. Total project costs were

[4] Illinois Policy Manual for Energy Efficiency Version 1.1, Page 25, footnote 46.

Program	Initiative	Incremental Cost Source
		unavailable for these measures and therefore we set incremental costs equal to incentives in the absence of other information.
	Public Housing	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0.
	Behavioral Modification	No incremental costs associated with this initiative
	HVAC	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0.
	Appliance Recycling	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0.
	Multifamily	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0.
	Direct Distribution	Measure costs or measure cost assumptions were sourced from the IL-TRM V7.0.
Business Program	Standard	For almost all measures, measure costs or measure cost guidance (e.g., incremental costs for some measures are defined as a function of measure size or another measure parameter) from the IL-TRM V7.0 were applied. For a handful of measures without prescriptive measure costs, such as leak repair, we used the total project cost provided by AIC as the incremental cost.
	Custom	The evaluation team considered projects to be retrofits and used the reported project costs provided by AIC as the incremental cost.
	Retro-Commissioning	The evaluation team considered projects to be retrofits and used the reported project costs provided by AIC (including the cost of retro-commissioning studies) as the incremental cost.
	Streetlighting	Per IL-TRM V7.0 guidance, we assumed that the total project cost was the incremental cost.
	Building Operator Certification	For almost all measures, measure costs or measure cost guidance (e.g., incremental costs for some measures are defined as a function of measure size or another measure parameter) from the IL-TRM V7.0 were applied. For a handful of measures without prescriptive measure costs, we used estimated[a] total project costs as the incremental cost.
Voltage Optimization Program		AIC's ongoing O&M costs for Voltage Optimization over the life of the circuits are considered to be the incremental costs for the Program. To determine these costs for our analysis, we took AIC's annual O&M cost estimates for circuits evaluated in 2019, extended them over the life of the circuits, and discounted costs to present value.

[a] Measures installed as a result of Building Operator Certification are akin to spillover and are not directly tracked by the program administrator. Instead, the evaluation team determined which measures were installed through research. Therefore, the evaluation team estimated project costs based on similar projects completed through other programs.

3.3 Other Assumptions

As directed by legislation, Opinion Dynamics used a societal discount rate to conduct the 2019 cost-effectiveness analysis. Opinion Dynamics used a nominal discount rate of 2.22% in the analysis (real discount rate of 0.68%), which aligns with the planning values AIC used for the 2018-2021 plan period.

4. Results, Findings, and Recommendations

Overall, AIC's 2019 energy efficiency portfolio was cost-effective as defined by the Illinois TRC test and the PAC test. Table 7 provides the Illinois TRC and PAC test benefit-cost ratios, calculated for the energy efficiency portfolio, the Residential and Business Programs, and the initiatives that compose them.

Table 7. Illinois TRC and PAC Test Results for the 2019 AIC Portfolio

Program	Initiative	Illinois TRC Benefit-Cost Ratio	PAC Benefit-Cost Ratio
Residential	Retail Products	*5.66*	*3.27*
Residential	Income Qualified - Single Family	*1.27*	*0.65*
Residential	Income Qualified - CAA	*0.47*	*0.61*
Residential	Income Qualified - Multifamily	*2.28*	*1.10*
Residential	Income Qualified - Smart Savers	*3.50*	*1.69*
Residential	Public Housing	*1.69*	*0.70*
Residential	Behavioral Modification	*0.29*	*0.24*
Residential	HVAC	*4.54*	*2.46*
Residential	Appliance Recycling	*0.84*	*0.73*
Residential	Multifamily	*1.92*	*1.35*
Residential	Direct Distribution	*8.46*	*1.92*
Residential Program Total[a]		*2.60*	*1.39*
Business	Standard	*2.27*	*4.08*
Business	Custom	*2.64*	*3.31*
Business	Retro-Commissioning	*2.10*	*2.43*
Business	Streetlighting	*2.58*	*2.15*
Business Program Total		*2.32*	*3.88*
2019 AIC Portfolio[b]		**2.19**	**2.22**

[a] The Residential Program benefit-cost ratios also include non-participant spillover benefits.

[b] The Portfolio-level benefit cost ratios include the costs and benefits generated through the Building Operator Certification Initiative. This initiative is included in AIC's Business Program, the costs and benefits are only included at the portfolio level because the costs for this initiative are included under portfolio administration costs and cannot be disaggregated. Therefore, the costs and benefits for this initiative could not be incorporated into the Business Program benefit cost ratio in a balanced manner.

AIC's 2019 Voltage Optimization Program was also cost-effective as defined by the Illinois TRC test and the PAC test. Table 2 provides the Illinois TRC and PAC test benefit-cost ratios calculated for the Program.

Table 8. Illinois TRC and PAC Test Results for the 2019 AIC Voltage Optimization Program

Program	Illinois TRC Benefit-Cost Ratio	PAC Benefit-Cost Ratio
Voltage Optimization	4.76	3.54

4.1 Key Findings

Key findings from the 2019 cost-effectiveness analysis are presented below.

- Overall, AIC's energy efficiency portfolio (inclusive of low-income programs, which is not required by Illinois law) was cost-effective based on the Illinois TRC test.
- Both the Residential and Business Programs were cost-effective based on the Illinois TRC.[5]
- Three initiatives, Income Qualified – CAA, Behavioral Modification, and Appliance Recycling were not cost-effective based on the Illinois TRC.
  - The Income Qualified - CAA Initiative has an Illinois TRC benefit-cost ratio of 0.47.
  - The Behavioral Modification Initiative has an Illinois TRC benefit-cost ratio of 0.29.
    - The low benefit-cost ratio for this initiative is driven by poor evaluation results. Notably, evaluation found an electric realization rate of 29% and a gas realization rate of 0% for the initiative.
  - The Appliance Recycling Initiative has an Illinois TRC benefit-cost ratio of 0.84.
- The Voltage Optimization Program, analyzed for the first time in 2019, was highly cost-effective (Illinois TRC benefit-cost ratio of 4.76).

[5] Portfolio-level administrative costs were not considered as part of the benefit-cost ratios presented for individual programs or initiatives, and therefore, individual program and initiative benefit-cost ratios are inflated as compared to the portfolio-level benefit-cost ratio. Nevertheless, inclusion of these costs in either the Residential or Business Program analyses would not cause either program to become non-cost-effective.

Appendix A. Energy Efficiency Portfolio Cost-Effectiveness Tables

Detailed cost-effectiveness results for the AIC energy efficiency portfolio, aligning with the SAG template for cost-effectiveness reporting and including initiative-level benefits, costs, and benefit-cost ratios, are provided in Table 9, Table 10, Table 11, and Table 12 below. The results are also attached as a spreadsheet.

Table 9. 2019 AIC Energy Efficiency Portfolio Cost-Effectiveness Benefits

Program	Avoided Electric Production	Avoided Electric Capacity	Avoided Gas Production	Avoided Water Costs	Avoided O&M Costs	Avoided GHG Emissions
(a)	*(b)*	*(c)*	*(d)*	*(e)*	*(f)*	*(g)*
Residential Program	$34,261,855	$22,691,407	$12,075,816	$5,528,397	$9,185,625	$13,170,788
Retail Products	*$19,969,303*	*$8,617,861*	*$1,016,270*	*$35,131*	*$8,996,825*	*$7,199,541*
Income Qualified – Single Family	*$4,348,912*	*$5,143,260*	*$6,845,624*	*$563,711*	*$61,949*	*$1,950,672*
Income Qualified – CAA	*$411,646*	*$497,438*	*$985,305*	*$136,361*	*$11,012*	*$200,005*
Income Qualified – Multifamily	*$670,129*	*$319,575*	*$154,666*	*$342,284*	*$7,523*	*$262,770*
Income Qualified – Smart Savers	*$1,432,886*	*$1,051,145*	*$1,801,369*	*$0*	*$0*	*$561,607*
Public Housing	*$355,987*	*$211,748*	*$189,748*	*$946,118*	*$17,951*	*$142,013*
Behavioral Modification	*$129,946*	*$61,935*	*$0*	*$0*	*$0*	*$44,689*
HVAC	*$3,603,086*	*$5,303,314*	*$438,660*	*$0*	*$0*	*$1,588,931*
Appliance Recycling	*$883,314*	*$312,371*	*$0*	*$0*	*$0*	*$305,421*
Multifamily	*$527,247*	*$266,197*	*$171,222*	*$70,975*	*$4,233*	*$203,968*
Direct Distribution	*$1,119,103*	*$513,743*	*$354,607*	*$3,433,817*	*$86,132*	*$409,834*
Non-Participant Spillover	*$810,298*	*$392,818*	*$118,344*	*$0*	*$0*	*$301,337*
Business Program	$110,983,486	$60,449,725	$5,549,934	$219,772	$37,998,605	$47,702,902
Standard	*$93,839,497*	*$53,400,556*	*-$2,103,666*	*$219,772*	*$37,797,363*	*$40,064,153*
Custom	*$14,141,081*	*$6,857,681*	*$7,343,273*	*$0*	*$0*	*$6,490,009*
Retro-Commissioning	*$1,078,055*	*$191,487*	*$310,327*	*$0*	*$0*	*$370,885*
Streetlighting	*$1,924,853*	*$0*	*$0*	*$0*	*$201,242*	*$777,855*
Portfolio Costs	$0	$0	$0	$0	$0	$0
BED	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
EM&V	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Marketing & Education	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Administrative Expenses	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*

Program	Avoided Electric Production	Avoided Electric Capacity	Avoided Gas Production	Avoided Water Costs	Avoided O&M Costs	Avoided GHG Emissions
Program Implementation	*$0*	*$0*	*$0*	*$0*	*$0*	*$0*
Portfolio Benefits	$186,422	$111,098	$175,273	$0	$52,364	$81,208
Building Operator Certification	*$186,422*	*$111,098*	*$175,273*	*$0*	*$52,364*	*$81,208*
AIC 2019 Portfolio	**$145,431,763**	**$83,252,230**	**$17,801,022**	**$5,748,169**	**$47,236,595**	**$60,954,898**

Table 10. 2019 AIC Energy Efficiency Portfolio Cost-Effectiveness Costs

Program	Non-Incentive Costs (Electric)	Non-Incentive Costs (Gas)	Incentive Costs (Electric)	Incentive Costs (Gas)	Incremental Costs (Net)
(a)	*(h)*	*(i)*	*(j)*	*(k)*	*(l)*
Residential Program	$13,225,326	$2,025,414	$27,654,697	$6,847,950	$22,082,991
Retail Products	*$2,693,265*	*$357,759*	*$5,305,070*	*$692,796*	*$5,049,813*
Income Qualified - Single Family	*$4,129,115*	*$1,040,621*	*$15,452,431*	*$4,323,847*	*$9,693,715*
Income Qualified - CAA	*$1,079,331*	*$153,942*	*$1,257,312*	*$616,743*	*$3,516,185*
Income Qualified - Multifamily	*$590,769*	*$79,310*	*$330,101*	*$40,510*	*$102,016*
Income Qualified - Smart Savers	*$517,106*	*$113,577*	*$990,831*	*$910,930*	*$756,000*
Public Housing	*$771,816*	*$85,762*	*$179,490*	*$47,973*	*$246,471*
Behavioral Modification	*$768,838*	*$43,682*	*$0*	*$0*	*$0*
HVAC	*$622,152*	*$46,330*	*$3,029,047*	*$94,922*	*$1,742,282*
Appliance Recycling	*$1,285,657*	*$0*	*$351,906*	*$0*	*$500,147*
Multifamily	*$388,420*	*$59,400*	*$232,176*	*$35,612*	*$200,490*
Direct Distribution	*$378,858*	*$45,032*	*$526,334*	*$84,616*	*$275,871*
Non-Participant Spillover	*$0*	*$0*	*$0*	*$0*	*$0*
Business Program	$9,990,271	$1,202,110	$31,526,875	$2,923,332	$102,205,983
Standard	*$7,040,209*	*$429,470*	*$26,940,502*	*$1,127,754*	*$90,695,117*
Custom	*$2,639,446*	*$624,139*	*$3,605,029*	*$1,691,571*	*$9,916,799*
Retro-Commissioning	*$155,308*	*$148,500*	*$241,683*	*$104,007*	*$624,895*
Streetlighting	*$155,308*	*$0*	*$739,662*	*$0*	*$969,172*
Portfolio Administration Costs[b]	$12,091,692	$1,657,070	$1,346,487	$315,654	$0
BED	*$3,101,462*	*$160,902*	*$0*	*$0*	*$0*
EM&V	*$2,189,671*	*$327,844*	*$0*	*$0*	*$0*
Marketing & Education	*$3,326,156*	*$478,443*	*$0*	*$0*	*$0*
Administrative Expenses	*$5,048,383*	*$704,516*	*$0*	*$0*	*$0*
Program Implementation	*-$1,573,979*	*-$14,634*	*$1,346,487*	*$315,654*	*$0*
Portfolio Benefits	$0	$0	$0	$0	$53,744

Program	Non-Incentive Costs (Electric)	Non-Incentive Costs (Gas)	Incentive Costs (Electric)	Incentive Costs (Gas)	Incremental Costs (Net)
Building Operator Certification	*$0*[a]	*$0*[a]	*$0*[a]	*$0*[a]	*$53,744*
AIC 2019 Portfolio	**$35,307,289**	**$4,884,595**	**$60,528,058**	**$10,086,936**	**$124,342,717**

[a] The implementation costs for this initiative are included under portfolio administration costs and could not be disaggregated.

[b] These costs are inclusive of any costs from the 2018 and 2020 portfolios that occurred in 2019.

Table 11. 2019 AIC Energy Efficiency Portfolio Illinois Total Resource Cost Test

Program	IL TRC Benefits	IL TRC Costs	IL TRC Test Net Benefits	IL TRC Test Ratio
(a)	*(m) =(b+c+d+e+f+g)*	*(n) =(h+i+l)*	*(o)=(m-n)*	*(p)=(m/n)*
Residential Program	$96,913,888	$37,333,731	$59,580,157	2.60
Retail Products	*$45,834,931*	*$8,100,838*	*$37,734,093*	*5.66*
Income Qualified - Single Family	*$18,914,129*	*$14,863,451*	*$4,050,679*	*1.27*
Income Qualified - CAA	*$2,241,768*	*$4,749,458*	*-$2,507,690*	*0.47*
Income Qualified - Multifamily	*$1,756,947*	*$772,095*	*$984,852*	*2.28*
Income Qualified - Smart Savers	*$4,847,008*	*$1,386,683*	*$3,460,325*	*3.50*
Public Housing	*$1,863,565*	*$1,104,049*	*$759,516*	*1.69*
Behavioral Modification	*$236,570*	*$812,519*	*-$575,949*	*0.29*
HVAC	*$10,933,990*	*$2,410,764*	*$8,523,226*	*4.54*
Appliance Recycling	*$1,501,106*	*$1,785,804*	*-$284,698*	*0.84*
Multifamily	*$1,243,841*	*$648,310*	*$595,532*	*1.92*
Direct Distribution	*$5,917,236*	*$699,760*	*$5,217,476*	*8.46*
Non-Participant Spillover	*$1,622,796*	*$0*	*$1,622,796*	*N/A*
Business Program	$262,904,423	$113,398,364	$149,506,059	2.32
Standard	*$223,217,675*	*$98,164,796*	*$125,052,879*	*2.27*
Custom	*$34,832,044*	*$13,180,385*	*$21,651,659*	*2.64*
Retro-Commissioning	*$1,950,754*	*$928,703*	*$1,022,051*	*2.10*
Streetlighting	*$2,903,951*	*$1,124,480*	*$1,779,471*	*2.58*
Portfolio Administration Costs[c]	$0	$13,748,763	-$13,748,763	N/A
BED	*$0*	*$3,262,363*	*-$3,262,363*	*N/A*
EM&V	*$0*	*$2,517,516*	*-$2,517,516*	*N/A*
Marketing & Education	*$0*	*$3,804,599*	*-$3,804,599*	*N/A*
Administrative Expenses	*$0*	*$5,752,899*	*-$5,752,899*	*N/A*
Program Implementation	*$0*	*-$1,588,614*	*$1,588,614*	*N/A*
Portfolio Benefits	$606,365	$53,744	$552,621	N/A[b]
Building Operator Certification	*$606,365*	*$53,744*	*$552,621*	*N/A[b]*
AIC 2019 Portfolio	**$360,424,677**	**$164,534,601**	**$195,890,075**	**2.19**

[a] The implementation costs for this initiative are included under portfolio administration costs and could not be disaggregated.

[b] The evaluation team could not calculate a benefit-cost ratio for the Building Operator Certification Initiative. The implementation costs for this initiative are included under portfolio administration costs and could not be disaggregated. Therefore, any benefit-cost calculation would be unbalanced.

[c] These costs are inclusive of any costs from the 2018 and 2020 portfolios that occurred in 2019.

Table 12. 2019 AIC Energy Efficiency Portfolio Utility Cost Test/Program Administrator Cost Test

Program	PAC Benefits	PAC Costs	PAC Test Net Benefits	PAC Test Ratio
(a)	*(q) =(b+c+d)*	*(r) =(h+i+j+k)*	*(s)=(q-r)*	*(t)=(q/r)*
Residential Program	$69,029,078	$49,753,387	$19,275,691	1.39
Retail Products	*$29,603,434*	*$9,048,891*	*$20,554,543*	*3.27*
Income Qualified - Single Family	*$16,337,797*	*$24,946,014*	*-$8,608,218*	*0.65*
Income Qualified - CAA	*$1,894,389*	*$3,107,327*	*-$1,212,938*	*0.61*
Income Qualified - Multifamily	*$1,144,371*	*$1,040,690*	*$103,681*	*1.10*
Income Qualified - Smart Savers	*$4,285,401*	*$2,532,444*	*$1,752,957*	*1.69*
Public Housing	*$757,483*	*$1,085,042*	*-$327,559*	*0.70*
Behavioral Modification	*$191,881*	*$812,519*	*-$620,638*	*0.24*
HVAC	*$9,345,060*	*$3,792,451*	*$5,552,609*	*2.46*
Appliance Recycling	*$1,195,685*	*$1,637,563*	*-$441,878*	*0.73*
Multifamily	*$964,666*	*$715,607*	*$249,059*	*1.35*
Direct Distribution	*$1,987,453*	*$1,034,839*	*$952,614*	*1.92*
Non-Participant Spillover	*$1,321,459*	*$0*	*$1,321,459*	*N/A*
Business Program	$176,983,145	$45,642,588	$131,340,557	3.88
Standard	*$145,136,387*	*$35,537,935*	*$109,598,453*	*4.08*
Custom	*$28,342,035*	*$8,560,185*	*$19,781,850*	*3.31*
Retro-Commissioning	*$1,579,869*	*$649,498*	*$930,371*	*2.43*
Streetlighting	*$1,924,853*	*$894,969*	*$1,029,884*	*2.15*
Portfolio Administration Costs[c]	$0	$15,410,903	-$15,410,903	*N/A*
BED	*$0*	*$3,262,363*	*-$3,262,363*	*N/A*
EM&V	*$0*	*$2,517,516*	*-$2,517,516*	*N/A*
Marketing & Education	*$0*	*$3,804,599*	*-$3,804,599*	*N/A*
Administrative Expenses	*$0*	*$5,752,899*	*-$5,752,899*	*N/A*
Program Implementation	*$0*	*$73,527*	*-$73,527*	*N/A*
Portfolio Benefits	$472,792	$0	$472,792	N/A[a]
Building Operator Certification	*$472,792*	*$0[a]*	*$472,792*	*N/A[a]*
AIC 2019 Portfolio	**$246,485,015**	**$110,806,878**	**$135,678,137**	**2.22**

[a] The implementation costs for this initiative are included under portfolio administration costs and could not be disaggregated.

[b] The evaluation team could not calculate a benefit-cost ratio for the Building Operator Certification Initiative. The implementation costs for this initiative are included under portfolio administration costs and could not be disaggregated. Therefore, any benefit-cost calculation would be unbalanced.

[c] These costs are inclusive of any costs from the 2018 and 2020 portfolios that occurred in 2019.

Appendix B. Voltage Optimization Program Cost Effectiveness Tables

Detailed cost-effectiveness results for the Voltage Optimization Program, aligning with the SAG template for cost-effectiveness reporting and including program-level benefits, costs, and benefit-cost ratios, are provided in Table 13, Table 14, Table 15, and Table 16 below. The results are also attached as a spreadsheet.

Table 13. 2019 AIC Voltage Optimization Program Cost-Effectiveness Benefits

Program	Avoided Electric Production	Avoided Electric Capacity	Avoided Gas Production	Avoided Water Costs	Avoided O&M Costs	Avoided GHG Emissions
(a)	*(b)*	*(c)*	*(d)*	*(e)*	*(f)*	*(g)*
Voltage Optimization	$5,808,352	$1,796,664	$0	$0	$0	$2,643,360

Table 14. 2019 AIC Voltage Optimization Program Cost-Effectiveness Costs

Program	Non-Incentive Costs (Electric)[a]	Non-Incentive Costs (Gas)	Incentive Costs (Electric)	Incentive Costs (Gas)	Incremental Costs (Net)
(a)	*(h)*	*(i)*	*(j)*	*(k)*	*(l)*
Voltage Optimization	$1,149,608	$0	$0	$0	$1,001,485

[a] Non-incentive costs include software costs, capital investment costs, and one-time installation and maintenance costs.

Table 15. 2019 AIC Voltage Optimization Program Illinois Total Resource Cost Test

Program	IL TRC Benefits	IL TRC Costs	IL TRC Test Net Benefits	IL TRC Test Ratio
(a)	*(m) =(b+c+d+e+f+g)*	*(n) =(h+i+l)*	*(o)=(m-n)*	*(p)=(m/n)*
Voltage Optimization	$10,248,376	$2,151,093	$8,097,283	4.76

Table 16. 2019 AIC Voltage Optimization Program Utility Cost Test/Program Administrator Cost Test

Program	PAC Benefits	PAC Costs	PAC Test Net Benefits	PAC Test Ratio
(a)	*(q) =(b+c+d)*	*(r) =(h+i+j+k+l)[a]*	*(s)=(q-r)*	*(t)=(q/r)*
Voltage Optimization	$7,605,016	$2,151,093	$5,453,923	3.54

[a] For the purposes of the PAC, the evaluation team adjusted the costs to include incremental measure costs because these costs are borne by the utility.

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