NAVIGANT

Business Energy Efficiency Rebates Impact Evaluation Report

Energy Efficiency Plan: Plan Year 2018 (1/1/2018-12/31/2018)

Presented to
Nicor Gas Company

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1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2018 Business Energy Efficiency Rebates (BEER) Program. It presents a summary of the energy impacts for the total program and broken out by relevant measure and program structure details. The appendix presents the impact analysis methodology. Program Year 2018 covers January 1, 2018 through December 31, 2018.

2. Program Description

Through the BEER Program, business and public sector customers receive incentives for installing new, highly efficient space heating, water heating, pipe insulation and commercial kitchen equipment covered by the program, as well as rebates for other prescriptive cost-effective equipment and services to improve the energy efficiency of existing equipment. The program's target market is business and public sector customers using 60,000 therms or more per year, with reliance on wholesale and retail trade allies and business trade associations to assist in the marketing of the program to Nicor Gas' end-use customers. In addition, the program offers free assessment and direct install measures such as efficient bathroom and kitchen faucet aerators, pre-rinse sprayers and low flow showerheads. The BEER Program is implemented by CLEAResult.

Overall, the 2018 program had realized energy savings from 442 participants (345 private and 97 public) and completed 468 projects (378 private and 90 public) as shown in the following table.

Table 2-1. 2018 Volumetric Summary

Participation	Direct Install	Prescriptive	Total
Private Sector			
Participants †	22	323	345
Installed Projects ‡	23	355	378
Measure Types Installed	5	20	25
Public Sector			
Participants †	42	58	97
Installed Projects ‡	44	46	90
Measure Types Installed	6	10	16
Program 2018 Total			
Participants †	64	381	442
Installed Projects ‡	67	401	468
Measure Types Installed	6	21	27

† Participants are defined as number of unique first and last names or business name
‡ Installed Projects are defined as the number of unique project IDs
Source: Nicor Gas tracking data and Navigant team analysis.

Table 2-2 through Table 2-4 summarize the installed measure quantities that are the basis for verified energy savings.

Table 2-2. 2018 Installed Measure Quantities – Program Total

Program Path	Measure	Quantity Unit	Installed Quantity
Direct Install	Faucet Aerator - Bath	Each	1,474
	Faucet Aerator – Bath Laminar	Each	333
	Faucet Aerator - Kitchen	Each	268
	Showerheads	Each	873
	Spray Valve (Med Sized Restaurants)	Each	11
	Spray Valve (Small Restaurants)	Each	6
Prescriptive	Boiler Tune Up, Process	Each	14
	Boiler Tune Up, Space Heating	Each	60
	Combination Oven	Each	2
	Convection Oven	Each	3
	Demand Controlled Ventilation	Each	341
	Direct-Fired Space Heater	Each	6
	Fryer – E>50%	Each	21
	Fryer – Large Vat	Each	5
	High Efficiency Boiler	Each	22
	High Efficiency Furnace	Each	125
	Infrared Charbroiler	Each	1
	Infrared Heaters	Each	24
	Outdoor Pool Covers	Sq. Ft	5,432
	Ozone Laundry	Each	1
	Pasta Cooker	Each	3
	Pipe Insulation	Ln Ft	7,086
	Programmable Thermostat	Each	49
	Rack Oven - Single	Each	1
	Small Pipe Insulation	Ln Ft	1,324
	Steam Trap	Each	1,305
	Storage Water Heater	Each	4

Source: Nicor Gas tracking data and Navigant team analysis.

Table 2-3. 2018 Installed Measure Quantities – Private Sector

Program Path	Measure	Quantity Unit	Installed Quantity
Direct Install	Faucet Aerator - Bath	Each	233
	Faucet Aerator – Bath Laminar	Each	109
	Faucet Aerator - Kitchen	Each	7
	Showerheads	Each	793
	Spray Valve (Small Restaurants)	Each	5
Prescriptive	Boiler Tune Up, Process	Each	13
	Boiler Tune Up, Space Heating	Each	19
	Combination Oven	Each	2
	Demand Controlled Ventilation	Each	317
	Direct-Fired Space Heater	Each	6
	Fryer – E>50%	Each	21
	Fryer – Large Vat	Each	5
	High Efficiency Boiler	Each	12
	High Efficiency Furnace	Each	107
	Infrared Charbroiler	Each	1
	Infrared Heaters	Each	16
	Outdoor Pool Covers	Sq. Ft	5,432
	Ozone Laundry	Each	1
	Pasta Cooker	Each	3
	Pipe Insulation	Ln Ft	6,425
	Programmable Thermostat	Each	49
	Rack Oven - Single	Each	1
	Small Pipe Insulation	Ln Ft	1,324
	Steam Trap	Each	1,110
	Storage Water Heater	Each	1

Source: Nicor Gas tracking data and Navigant team analysis.

Table 2-4. 2018 Installed Measure Quantities – Public Sector

Program Path	Measure	Quantity Unit	Installed Quantity
Direct Install	Faucet Aerator - Bath	Each	1,241
	Faucet Aerator – Bath Laminar	Each	224
	Faucet Aerator - Kitchen	Each	261
	Showerheads	Each	80
	Spray Valve (Med Sized Restaurants)	Each	11
	Spray Valve (Small Restaurants)	Each	1
Prescriptive	Boiler Tune Up, Process	Each	1
	Boiler Tune Up, Space Heating	Each	41
	Convection Oven	Each	3
	Demand Controlled Ventilation	Each	24
	High Efficiency Boiler	Each	10
	High Efficiency Furnace	Each	18
	Infrared Heaters	Each	8
	Pipe Insulation	Ln Ft	661
	Steam Trap	Each	195
	Storage Water Heater	Each	3

Source: Nicor Gas tracking data and Navigant team analysis.

3. Program Savings Summary

Table 3-1 summarizes the energy savings the BEER Program achieved by path in 2018. The private sector contributed 94 percent of the verified net savings, and the public sector contributed 6 percent.

Table 3-1. 2018 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (therms)	Verified Gross RR†	Verified Gross Savings (therms)	NTG‡	Verified Net Savings (therms)
Private Sector					
Direct Install	23,366	102%	23,739	0.68	16,143
Prescriptive	2,458,276	100%	2,447,792	0.68	1,664,499
Private 2018 Total	**2,481,642**	**100%**	**2,471,532**	**0.68**	**1,680,641**
Public Sector					
Direct Install	25,642	100%	25,645	0.68	17,439
Prescriptive	133,987	100%	134,028	0.68	91,139
Public 2018 Total	**159,629**	**100%**	**159,673**	**0.68**	**108,578**
Program 2018 Total	**2,641,271**	**100%**	**2,631,205**	**0.68**	**1,789,219**

† Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
‡ Net-to-Gross Ratio (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor Gas GPY7 NTG Values 2017-03-01 Final Faucet Aerator Correction 2019-03-20.xlsx, which is to be found on the Illinois SAG web site: http://ilsag.info/net-to-gross-framework.html.
Source: Nicor Gas tracking data and Navigant team analysis.

4. Program Savings by Measure

The program includes 27 measure types as shown in the following table. Overall, steam traps and pipe insulation measures contributed the most savings. Steam traps represented 75 percent of net savings, and pipe insulation measures represented 8 percent of net savings.

Table 4-1. 2018 Annual Energy Savings by Measure – Program Total

Program Path	Research Category	Ex Ante Gross Savings (therms)	Verified Gross RR	Verified Gross Savings (therms)	NTG	Verified Net Savings (therms)
Direct Install	Faucet Aerator – Bath	12,909	103%	13,236	0.68	9,001
	Faucet Aerator – Bath Laminar	11,799	100%	11,799	0.68	8,023
	Faucet Aerator – Kitchen	3,209	101%	3,227	0.68	2,194
	Showerheads	18,857	100%	18,887	0.68	12,843
	Spray Valve (Med Sized Restaurants)	1,891	100%	1,891	0.68	1,286
	Spray Valve (Small Restaurants)	344	100%	344	0.68	234
Prescriptive	Boiler Tune Up, Process	80,612	100%	80,612	0.68	54,816
	Boiler Tune Up, Space Heating	84,789	100%	84,819	0.68	57,677
	Combination Oven	727	100%	728	0.68	495
	Convection Oven	1,124	100%	1,124	0.68	764
	Demand Controlled Ventilation	48,860	100%	48,860	0.68	33,225
	Direct-Fired Space Heater	27,652	100%	27,652	0.68	18,803
	Fryer – E>50%	22,607	100%	22,607	0.68	15,373
	Fryer – Large Vat	3,468	100%	3,468	0.68	2,358
	High Efficiency Boiler	69,415	100%	69,449	0.68	47,225
	High Efficiency Furnace	32,474	100%	32,481	0.68	22,087
	Infrared Charbroiler	707	100%	707	0.68	481
	Infrared Heaters	10,824	100%	10,824	0.68	7,360
	Outdoor Pool Covers	5,486	100%	5,486	0.68	3,731
	Ozone Laundry	3,379	100%	3,379	0.68	2,298
	Pasta Cooker	4,140	100%	4,140	0.68	2,815
	Pipe Insulation	218,491	100%	218,491	0.68	148,574
	Programmable Thermostat	1,967	73%	1,428	0.68	971
	Rack Oven – Single	1,034	100%	1,034	0.68	703
	Small Pipe Insulation	247	100%	247	0.68	168
	Steam Trap	1,973,920	99%	1,963,958	0.68	1,335,491
	Storage Water Heater	338	96%	326	0.68	222
	Program 2018 Total	**2,6412,271**	**100%**	**2,631,205**	**0.68**	**1,789,219**

Source: Nicor Gas tracking data and Navigant team analysis.

For the private sector, the prescriptive path contributed 99 percent of net savings, while the direct install path contributed one percent. Steam traps and pipe insulation contributed the most savings; 79 percent and 9 percent respectively of the net savings.

Table 4-2. 2018 Annual Energy Savings by Measure – Private Sector

Program Path	Research Category	Ex Ante Gross Savings (therms)	Verified Gross RR	Verified Gross Savings (therms)	NTG	Verified Net Savings (therms)
Direct Install	Faucet Aerator – Bath	2,052	116%	2,379	0.68	1,618
	Faucet Aerator – Bath Laminar	3,862	100%	3,862	0.68	2,626
	Faucet Aerator – Kitchen	37	149%	55	0.68	38
	Showerheads	17,129	100%	17,157	0.68	11,666
	Spray Valve (Small Restaurants)	287	100%	287	0.68	195
Prescriptive	Boiler Tune Up, Process	75,836	100%	75,836	0.68	51,568
	Boiler Tune Up, Space Heating	30,386	100%	30,386	0.68	20,663
	Combination Oven	727	100%	728	0.68	495
	Demand Controlled Ventilation	41,015	100%	41,015	0.68	27,890
	Direct-Fired Space Heater	27,652	100%	27,652	0.68	18,803
	Fryer – E>50%	22,607	100%	22,607	0.68	15,373
	Fryer – Large Vat	3,468	100%	3,468	0.68	2,358
	High Efficiency Boiler	30,522	100%	30,522	0.68	20,755
	High Efficiency Furnace	27,822	100%	27,822	0.68	18,919
	Infrared Charbroiler	707	100%	707	0.68	481
	Infrared Heaters	7,216	100%	7,216	0.68	4,907
	Outdoor Pool Covers	5,486	100%	5,486	0.68	3,731
	Ozone Laundry	3,379	100%	3,379	0.68	2,298
	Pasta Cooker	4,140	100%	4,140	0.68	2,815
	Pipe Insulation	216,378	100%	216,378	0.68	147,137
	Programmable Thermostat	1,967	73%	1,428	0.68	971
	Rack Oven – Single	1,034	100%	1,034	0.68	703
	Small Pipe Insulation	247	100%	247	0.68	168
	Steam Trap	1,957,588	99%	1,947,626	0.68	1,324,385
	Storage Water Heater	97	118%	114	0.68	78
	Private 2018 Total	**2,481,642**	**100%**	**2,471,532**	**0.68**	**1,680,641**

Source: Nicor Gas tracking data and Navigant team analysis.

For the public sector, the prescriptive path contributed 84 percent of net savings, while the direct install path contributed 16 percent. Boiler tune-ups, high efficiency boilers, and faucet aerators contributed the most savings; 34 percent, 24 percent, and 14 percent respectively of the net savings.

Table 4-3. 2018 Annual Energy Savings by Measure – Public Sector

Program Path	Research Category	Ex Ante Gross Savings (therms)	Verified Gross RR	Verified Gross Savings (therms)	NTG	Verified Net Savings (therms)
Direct Install	Faucet Aerator – Bath	10,857	100%	10,857	0.68	7,383
	Faucet Aerator – Bath Laminar	7,937	100%	7,937	0.68	5,397
	Faucet Aerator – Kitchen	3,172	100%	3,172	0.68	2,157
	Showerheads	1,728	100%	1,731	0.68	1,177
	Spray Valve (Med Sized Restaurants)	1,891	100%	1,891	0.68	1,286
	Spray Valve (Small Restaurants)	57	100%	57	0.68	39
Prescriptive	Boiler Tune Up, Process	4,776	100%	4,776	0.68	3,248
	Boiler Tune Up, Space Heating	54,403	100%	54,433	0.68	37,014
	Convection Oven	1,124	100%	1,124	0.68	764
	Demand Controlled Ventilation	7,845	100%	7,845	0.68	5,335
	High Efficiency Boiler	38,893	100%	38,926	0.68	26,470
	High Efficiency Furnace	4,653	100%	4,660	0.68	3,168
	Infrared Heaters	3,608	100%	3,608	0.68	2,453
	Pipe Insulation	2,113	100%	2,113	0.68	1,437
	Steam Trap	16,332	100%	16,332	0.68	11,106
	Storage Water Heater	240	88%	212	0.68	144
	Public 2018 Total	**159,629**	**100%**	**159,673**	**0.68**	**108,578**

Source: Nicor Gas tracking data and Navigant team analysis.

5. Impact Analysis Findings and Recommendations

5.1 Impact Parameter Estimates

Table 5-1 shows the unit therm savings and realization rate findings by measure from our review. The realization rate is the ratio of the verified savings to the ex ante savings. Following the table, we provide findings and recommendations, including discussion of measures with realization rates above or below 100 percent. Appendix 6.1 provides a description of the impact analysis methodology.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms per unit)	Verified Gross (therms per unit)	Realization Rate	Data Source(s)
Faucet Aerator - Bath	Each	Varies	Varies	103%	IL TRM v6.0*, 4.3.2
Faucet Aerator – Bath Laminar	Each	Varies	Varies	100%	IL TRM v6.0*, 4.3.2
Faucet Aerator - Kitchen	Each	Varies	Varies	101%	IL TRM v6.0, 4.3.2
Showerheads	Each	21.6	21.6	100%	IL TRM v6.0, 4.3.3
Spray Valve (Med Sized Restaurants)	Each	171.9	171.9	100%	IL TRM v6.0, 4.2.11
Spray Valve (Small Restaurants)	Each	57.3	57.6	100%	IL TRM v6.0, 4.2.11
Boiler Tune Up, Process	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.3
Boiler Tune Up, Space Heating	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.2
Combination Oven	Each	363.7	364.0	100%	IL TRM v6.0, 4.2.1
Convection Oven	Each	Varies	Varies	100%	IL TRM v6.0, 4.2.5
Demand Controlled Ventilation	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.19
Direct-Fired Space Heater	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.39
Fryer – E>50%	Each	Varies	Varies	100%	IL TRM v6.0, 4.2.7
Fryer – Large Vat	Each	Varies	Varies	100%	IL TRM v6.0, 4.2.7
High Efficiency Boiler	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.10
High Efficiency Furnace	Each	Varies	Varies	100%	IL TRM v6.0, 4.4.11
Infrared Charbroiler	Each	707	707	100%	IL TRM v6.0, 4.4.12
Infrared Heaters	Each	451	451	100%	IL TRM v6.0, 4.4.12
Outdoor Pool Covers	Sq. Ft	1.01	1.01	100%	IL TRM v6.0, 4.3.4
Ozone Laundry	Each	3379.2	3379.5	100%	IL TRM v6.0, 4.3.6
Pasta Cooker	Each	1,380	1,380	100%	IL TRM v6.0, 4.2.17
Pipe Insulation	Ln. Ft.	Varies	Varies	100%	IL TRM v6.0, 4.4.14
Programmable Thermostat	Each	Varies	Varies	73%	IL TRM v6.0, 4.4.18
Rack Oven - Single	Each	1,034	1,034	100%	Nicor Gas Tracking Data
Small Pipe Insulation, ½ and ¾, Indoor Space Heat	Ln. Ft.	Varies	Varies	100%	IL TRM v6.0, 4.4.24
Steam Trap	Each	Varies	Varies	99%	IL TRM v6.0, 4.4.16
Storage Water Heater	Each	Varies	Varies	96%	IL TRM v6.0, 4.3.1

* State of Illinois Technical Reference Manual version 6.0 from http://www.ilsag.info/il_trm_version_6.html.
Source: Nicor Gas tracking data and Navigant team analysis.

5.2 Findings and Recommendations

Combination Oven

The verified gross savings realization rate for combination ovens was 100 percent. The pan capacity input value for savings calculation was not provided in the tracking database. CLEAResult clarified that the pan capacity used was 16 pans. The verified savings was based on 16 pans.

Recommendation 1: Navigant recommends Nicor Gas and CLEAResult track custom inputs when collected, specifically the pan capacity from Combination Oven specification sheets.

Faucet Aerator

Faucet aerators had an overall gross savings realization rate (RR) of 101 percent; 103 percent for bathroom aerators; 101 percent for kitchen aerators, and 100 percent for bathroom laminar aerators.

Nicor Gas used building-specific usage data as previously recommended in the GPY6 evaluation report. However, the 2018 tracking data has water usage values that do not match Navigant's recommended usage values used for savings verification associated with some projects' building type (see Table 5-2 below for building types observed in the 2018 tracking data and Table 6-1 in the Appendix for the complete list of building types).

Table 5-2. Building Type Mapping for Faucet Aerators

Tracking Data Building Type	Tracking Data Reported Usage (gallons/year)	Evaluator Recommended Usage* (gallons/year)
Assembly	5000 or 2500	5000
College	9000	9000
Elementary School	3000	3000
Healthcare Clinic	16425	16425
High School	9000	9000
Hospital - FCU	16425	16425
Manufacturing Facility	2500	5000
Office - Low Rise	5000 or 2500	2500
Office - Mid Rise	2500	5000
Religious Building	5000	5000
Restaurant	9581	9581 or 15768
Retail - Strip Mall	3650	3650

* Evaluator Recommended usage values are based on TRM v6.0 where tracked building types match the TRM, and on Navigant's recommended TRM v6 usage value of best fit where the TRM does not have a matching building type.
Source: Navigant analysis of tracking data

Recommendation 2: CLEAResult should review Navigant's recommended water usage values in Table 6-1 in Appendix and update the tracking system. Navigant recommended changing the mapping for the building types assembly, office mid-rise, restaurants and garage space. CLEAResult has indicated they will consider recommended changes in 2018.

Commercial Programmable Thermostat

Programmable thermostats had a gross savings realization rate of 73 percent.

The ex ante savings assume continuous fan mode for the baseline case and efficient ("proposed") case during the occupied period. But during the unoccupied period the baseline case is continuous, and the efficient case is intermittent. In the final 2018 tracking data, CLEAResult adopted Navigant's previous recommendation of using an average savings value (37.85 therms) for building types not deemed in the TRM.[1]

It appears that in the process of finalizing the 2018 data, the ex ante savings for Office – Low Rise were erroneously changed to the savings recommended by Navigant for Office – Mid Rise (based on Unknown/Other), during the 2018 early impact review.[2] The ex ante per unit savings for Office – Low Rise should be 14.40 therms, not 37.85 therms.

Table 5-3. Building Type Mapping for Programmable Thermostats

Tracking Data Building Type	Building Type Used by Nicor Gas for Ex Ante Savings	Building Type Used by Navigant for Verified Savings	Ex Ante Unit Therms Savings	Verified Unit Therms Savings
Assembly	Assembly	Assembly	56.13	56.13
Elementary School	Unknown/Other*	Unknown/Other*	37.85	37.85
Healthcare Clinic	Unknown/Other*	Unknown/Other*	37.85	37.85
Manufacturing Facility	Unknown/Other*	Unknown/Other*	37.85	37.85
Office - Low Rise	Office - Mid Rise** (Unknown/Other*)	Office - Low Rise	37.85	14.40
Office – Mid Rise***	NA	Unknown/Other*	NA	37.85
Religious Building	Religious Building	Religious Building	47.12	47.12
Restaurant	Restaurant – Full Service	Restaurant – Full Service	30.84	30.84
Retail - Department Store	Retail - Department Store	Retail - Department Store	36.31	36.31
Warehouse	Convenience Store	Unknown/Other*	37.85	37.85

* The TRM does not contain an "Other" or "Unknown" option. The verified unit savings value was calculated by Navigant by taking an average of the savings for each of the building types in the TRM.
** Appendix 1 recommends using the "Unknown/Other" verified savings for Office – Mid Rise.
*** *No thermostat measures were implemented in an Office – Mid Rise building. This row is included to highlight the usage difference between Office – Low Rise and Office – Mid Rise.*
Source: Navigant analysis of tracking data

Recommendation 3: Navigant recommends that the ex ante per unit savings for Office – Low Rise measures be changed to 14.4 therms.

[1] Nicor Gas GPY5 BEER Program Evaluation Report 2017-06-26 Final (Page 6)
[2] Nicor Gas 2018 BEER Program Interim Impact Review 2019-01-24.docx

Pre-rinse Spray Valves

The ex ante savings assume a custom value 0.5 hour per day that the pre-rinse spray valve is used at the site. Navigant did not change that to a TRM-compliant default value of 1.0. The savings realization rate was maintained at 100 percent.

Steam Traps

Steam traps had a gross savings realization rate of 99 percent.

The steam trap measures (Commercial, Dry Cleaner, Industrial) are dependent on the annual operating hours of the steam plant (TRM Section 4.4.16). The Commercial and Dry Cleaner steam trap measures both have a realization rate of 100 percent. To calculate savings for industrial steam trap projects, CLEAResult explained that they use the hours of use collected from the application for the project. If the hours are not provided on the application, the TRM default value of 8,282 hours was used. Navigant agrees with that approach. However, when Navigant used the tracking hours to calculate verified savings, the verified savings did not match the tracking savings.

Below is an example where the measure and EFLH are constant. The verified per unit savings is also constant, but the ex ante savings fluctuate, resulting in different realization rates. Steam trap savings are not building dependent. But, even if building type is held constant – example "College" building type – the ex ante savings are not consistent.

Table 5-4. Industrial Steam Traps Gross Realization Rates

Measure	Building Type	Vendor Project	Tracked Equivalent Full Load Hours	Ex Ante Unit Therms Savings	Verified Unit Therms Savings*	Gross Therms Realization Rate (RR)
Steam Trap, Indust MP 30-75 psig	Hospital – VAV econ	PRJ-2061580	8,760	1679.84	2324.2	138%
Steam Trap, Indust MP 30-75 psig	Manufacturing Facility	PRJ- 2099233	8,760	2431.5	2324.2	96%
Steam Trap, Indust MP 30-75 psig	Manufacturing Facility	PRJ- 2099233	8,760	2243.6	2324.2	104%
Steam Trap, Indust MP 30-75 psig	Hospital – CAV no econ	PRJ- 2099496	8,760	3183.1	2324.2	73%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2119771	8,760	1679.8	2324.2	138%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2119771	8,760	2055.6	2324.2	113%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2119771	8,760	2431.5	2324.2	96%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2119771	8,760	3183.1	2324.2	73%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2099496	8,760	2055.6	2324.2	113%
Steam Trap, Indust MP 30-75 psig	College	PRJ- 2099496	8,760	3183.1	2324.2	73%

* Verified savings are based on tracking system custom hours.
Source: Navigant analysis of tracking data

Recommendation 4: The ex ante custom hours of use for industrial-type steam traps are inconsistent with the claimed savings. Navigant recommends Nicor Gas and CLEAResult review the tracking system inputs and update the ex ante savings assumptions.

Storage Water Heater

Storage water heaters had a gross savings realization rate of 96 percent.

Navigant calculated the savings and the standby losses (the installed storage water heaters >75,000 Btu/h can claim additional savings due to lower standby losses) using the consumption per usable storage tank capacity method and the heating capacity data provided in the tracking system. The resulting gross savings realization rate is 96 percent. Navigant used custom inputs when provided. Navigant was unable to identify the cause of the realization rate discrepancy and has included Table 5-5 to show the inputs used for verified savings.

Table 5-5. Storage Water Heater Gross Realization Rates

Vendor Project ID	Tracking System "TRM Building Type" Variable	TRM Building Type	Capacity New Equipment	Size	SLEff	Hot Water Use	Post Installation Efficiency	Verified Gross RR
PRJ-1867780	Restaurant	Restaurant	199900	100	967	62200	0.97	118%
PRJ-1920836	Office – Low Rise	Small Office	300000	119	1084	60809	0.96	102%
PRJ-2111463	Unknown	Other Commercial	199900	80	1122	27280	0.98	75%
PRJ-2111463	Unknown	Other Commercial	199900	80	1122	27280	0.98	75%

Source: Navigant analysis of tracking data

Recommendation 5: Review the savings calculations in the tracking system for storage water heaters and ensure the inputs are consistent with the claimed savings.

6. Appendix 1. Impact Analysis Methodology

6.1 Verified Gross Program Savings Analysis Approach

Navigant determined verified gross savings for each program measure by conducting a tracking system review. Navigant used the Illinois TRM version 6.0 methodology to calculate verified gross savings.

In the table below, Navigant reviewed the water usage lookups for matching building type for faucet aerators, where usage values are defined or assigned based on the TRM building of best fit. Navigant recommends changes to three of the implementer's previously mapped building types:

(1) **Manufacturing Facility:** Navigant recommends the "Other" building type rather than the "Warehouse" building type.
(2) **Restaurant:** Navigant found that there was a restaurant in the tracking data which would be considered "Sit Down" and not "Fast Food." Navigant recommends that the usage values match the TRM, which provides separate values for the two restaurant types.
(3) **Office: Medium/Mid Rise**: Navigant recommends the "Other" building type rather than the "Small Office" building type. A small office has a usage value of 2,500 and a large office has a usage value of 11,250, and the value for "Other" (5,000) represents an acceptable average estimate.

Table 6-1. Detailed Building Type Mapping with Faucet Aerator Usage Values

Faucet Aerators Lookup Building Type List from Application	Nicor Gas TRM Building Type Mapped for Usage	Nicor Gas Usage Lookup (gallons/year)	Navigant Recommended TRM Building Type Mapping	Navigant Usage Lookup (gallons/year)
Assembly	Other	5,000	Other	5,000
Multifamily: Assisted Living	Other	5,000	Other	5,000
College/University	Jr High/High School	9,000	Jr High/High School	9,000
Convenience	Retail	3,650	Retail	3,650
Elementary School	Elementary School	3,000	Elementary School	3,000
Garage		**0**	**Other**	**5,000**
Grocery	Grocery	3,650	Grocery	3,650
Healthcare Clinic	Health	16,425	Health	16,425
High School	Jr High/High School	9,000	Jr High/High School	9,000
Hospital - CAV no econ	Health	16,425	Health	16,425
Hospital - CAV econ	Health	16,425	Health	16,425
Hospital - VAV econ	Health	16,425	Health	16,425
Hospital - FCU	Health	16,425	Health	16,425
Hotel/Motel	Motel / Hotel	1,552	Motel / Hotel	1,552
Hotel/Motel - Common	Motel / Hotel	1,552	Motel / Hotel	1,552
Hotel/Motel - Guest	Motel / Hotel	1,552	Motel / Hotel	1,552
Manufacturing Facility	**Warehouse**	**2,500**	**Other**	**5,000**

Faucet Aerators Lookup Building Type List from Application	Nicor Gas TRM Building Type Mapped for Usage	Nicor Gas Usage Lookup (gallons/year)	Navigant Recommended TRM Building Type Mapping	Navigant Usage Lookup (gallons/year)
Multifamily: High-rise	Motel	1,825	Motel	1,825
Multifamily: High-rise common	Motel	1,825	Motel	1,825
Multifamily: High rise residential	Motel	1,825	Motel	1,825
Multifamily: Mid-rise	Motel	1,825	Motel	1,825
Movie Theater	Other	5,000	Other	5000
Office: Large/High Rise - CAV no econ	Large Office	11,250	Large Office	11,250
Office: Large/High Rise - CAV econ	Large Office	11,250	Large Office	11,250
Office: Large/High Rise - VAV econ	Large Office	11,250	Large Office	11,250
Office: Large/High Rise - FCU	Large Office	11,250	Large Office	11,250
Office: Small/Low Rise	Small Office	2,500	Small Office	2,500
Office: Medium/Mid Rise	**Small Office**	**2,500**	**Other**	**5,000**
Religious Facility	Other	5,000	Other	5,000
Restaurant	**Fast Food Rest**	**9,581**	**Fast food = Sit down =**	**9,581 15,768**
Retail: Department Store	Retail	3,650	Retail	3,650
Retail: Strip Mall	Retail	3,650	Retail	3,650
Warehouse	Warehouse	2,500	Warehouse	2,500

Note: Highlighting in Bold indicates there are (1) differences between the implementer's and Navigant's mappings and (2) these differences impact CY2018's savings.
Source: Navigant analysis of tracking data

6.2 Verified Net Program Savings Analysis Approach

Navigant calculated verified net energy savings by multiplying the verified gross savings estimates by a net-to-gross (NTG) ratio. In 2018, the NTG ratio estimates used to calculate the net verified savings were based on past evaluation research and defined by a consensus process through SAG, as documented in a spreadsheet.[3]

[3] Source: Nicor Gas GPY7 NTG Values 2017-03-01 Final Faucet Aerator Correction 2019-03-20.xlsx, which is to be found on the IL SAG web site here: http://ilsag.info/net-to-gross-framework.html

7. Appendix 2. Program-Specific Inputs for the Illinois TRC

The Total Resource Cost (TRC) table includes cost-effectiveness analysis inputs available at the time of finalizing this 2018 impact evaluation report. Additional required cost data (e.g., measure costs, program level costs) are not included in this table and will be provided to the evaluation team later. Detail in this table (e.g., EULs) other than final 2018 savings and program data are subject to change and are not final.

Table 7-1. Total Resource Cost Savings Summary

Research Category	Units	Quantity	Effective Useful Life (years)	Ex Ante Gross Savings (therms)	Verified Gross Savings (therms)	Verified Net Savings (therms)
Faucet Aerator - Bath	Each	1,474	9	12,909	13,236	9,001
Faucet Aerator – Bath Laminar	Each	333	9	11,799	11,799	8,023
Faucet Aerator - Kitchen	Each	268	9	3,209	3,227	2,194
Showerheads	Each	873	10	18,857	18,887	12,843
Spray Valve (Med Sized Restaurants)	Each	11	5	1,891	1,891	1,286
Spray Valve (Small Restaurants)	Each	6	5	344	344	234
Boiler Tune Up, Process	Each	14	3	80,612	80,612	54,816
Boiler Tune Up, Space Heating	Each	60	3	84,789	84,819	57,677
Combination Oven	Each	2	12	727	728	495
Convection Oven	Each	3	12	1,124	1,124	764
Demand Controlled Ventilation	Each	341	10	48,860	48,860	33,225
Direct-Fired Space Heater	Each	6	15	27,652	27,652	18,803
Fryer – E>50%	Each	21	15	22,607	22,607	15,373
Fryer- Large Vat	Each	5	15	3,468	3,468	2,358
High Efficiency Boiler	Each	22	20	69,415	69,449	47,225
High Efficiency Furnace	Each	125	17	32,474	32,481	22,087
Infrared Charbroiler	Each	1	12	707	707	481
Infrared Heaters	Each	24	12	10,824	10,824	7,360
Outdoor Pool Covers	Sq. Ft.	5,432	6	5,486	5,486	3,731
Ozone Laundry	Each	1	10	3,379	3,379	2,298
Pasta Cooker	Each	3	12	4,140	4,140	2,815
Pipe Insulation	Ln. Ft.	7,086	15	218,491	218,491	148,574
Programmable Thermostat	Each	49	4	1,967	1,428	971
Rack Oven - Single	Each	1	12	1,034	1,034	703
Small Pipe Insul., ½ and ¾, Indoor Space Heat	Ln. Ft.	1,324	15	247	247	168
Steam Trap	Each	1,305	6	1,973,920	1,963,958	1,335,491
Storage Water Heater	Each	4	15	338	326	222
Total				**2,641,271**	**2,631,205**	**1,789,219**

Source: Navigant analysis of tracking data.