Business Energy Efficiency Rebates Impact Evaluation Report

Energy Efficiency Plan: Plan Year 2019 (1/1/2019-12/31/2019)

Presented to
Nicor Gas Company

Final

May 20, 2020

Prepared by:

Karl Walter
Guidehouse

Charles Ampong
Guidehouse

www.guidehouse.com

Business Energy Efficiency Rebates Impact Evaluation Report

Submitted to:

Nicor Gas Company
1844 Ferry Road
Naperville, IL 60563

Submitted by:

Guidehouse (which acquired Navigant in 2019)
150 N. Riverside Plaza, Suite 2100
Chicago, IL 60606

Contact:

Randy Gunn
Partner
312.583.5714
randy.gunn@guidehouse.com

Kevin Grabner
Associate Director
608.616.5805
kevin.grabner@guidehouse.com

Laura Agapay-Read
Managing Consultant
312.583.4178
laura.agapay.read@guidehouse.com

TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

1. Introduction

This report presents the results of the impact evaluation of the Nicor Gas 2019 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 2019 covers January 1, 2019 through December 31, 2019.

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.

The program had 194 participants in 2019 and completed 364 projects as shown in the following table.

Table 2-1. 2019 Volumetric Summary

Participation	Direct Install	Prescriptive	Total
Private Sector			
Participants *	10	108	117
Installed Projects †	10	160	170
Measure Types Installed	5	28	33
Public Sector			
Participants *	14	64	77
Installed Projects †	31	163	194
Measure Types Installed	4	16	20
Program 2019 Total			
Participants *	21	171	194
Installed Projects †	41	323	364
Measure Types Installed	5	31	36

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

Table 2-2 summarizes the installed measure quantities that are the basis for verified energy savings.

Table 2-2. 2019 Installed Measure Quantities

Program Category	Program Path	Measure	Quantity Unit	Installed Quantity
Private	Direct Install	Faucet Aerator - Bath	Each	36
		Faucet Aerator - Bath Laminar	Each	535
		Faucet Aerator - Kitchen	Each	2
		Showerheads	Each	38
		Spray Valve (Med Sized Restaurants)	Each	2
	Prescriptive	Boiler Reset Controls	Each	2
		Boiler Tune Up, Process	Each	19
		Boiler Tune Up, Space Heating	Each	10
		Combination Oven	Each	2
		Convection Oven	Each	1
		Demand Controlled Ventilation	Each	75
		Fryer	Each	11
		Griddle	Each	3
		High Efficiency Boiler	Each	11
		High Efficiency Furnace	Each	11
		Infrared Heaters	Each	77
		Pasta Cooker	Each	1
		Pipe Insulation	Ln Ft	150
		Programmable Thermostat	Each	8
		Steam Trap	Each	1608
		Storage Water Heater	Each	2
		Weather Stripping	Project	1
Public	Direct Install	Faucet Aerator - Bath	Each	328
		Faucet Aerator - Kitchen	Each	120
		Showerheads	Each	19
		Spray Valve (Med Sized Restaurants)	Each	1
	Prescriptive	Boiler Tune Up, Process	Each	2
		Boiler Tune Up, Space Heating	Each	84
		Convection Oven	Each	2
		Demand Controlled Ventilation	Each	19
		High Efficiency Boiler	Each	23
		High Efficiency Furnace	Each	5
		Infrared Heaters	Each	5
		Pipe Insulation	Ln Ft	8684
		Steam Trap	Each	680

Source: Nicor Gas tracking data and Guidehouse team analysis.

3. Savings Summary

Table 3-1 summarizes the energy savings the BEER program achieved by path in 2019.

Table 3-1. 2019 Annual Energy Savings Summary

Program Path	Ex Ante Gross Savings (Therms)	Verified Gross RR*	Verified Gross Savings (Therms)	NTG†	Verified Net Savings (Therms)
Private					
Direct Install	20,659	100%	20,686	0.68	14,066
Prescriptive	6,135,237	100%	6,136,041	0.68	4,172,508
Private Subtotal	**6,155,897**	**100%**	**6,156,727**	**0.68**	**4,186,574**
Public					
Direct Install	3,645	100%	3,652	0.68	2,483
Prescriptive	665,437	100%	665,031	0.68	452,221
Public Subtotal	**669,082**	**100%**	**668,683**	**0.68**	**454,705**
Total	**6,824,979**	**100%**	**6,825,410**	**0.68**	**4,641,279**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.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 Guidehouse team analysis.

4. Program Savings by Measure

The program includes 36 reported measure names, which Guidehouse collapsed into 22 Research Categories as shown in the following table. The steam trap, boiler and pipe insulation measures contributed the most savings.

Table 4-1. 2019 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	2,498	106%	2,640	0.68	1,795
	Faucet Aerator - Bath Laminar	18,956	100%	18,956	0.68	12,890
	Faucet Aerator - Kitchen	1,104	100%	1,104	0.68	751
	Showerheads	1,231	91%	1,122	0.68	763
	Spray Valve (Med Sized Restaurants)	516	100%	516	0.68	351
Prescriptive	Boiler Reset Controls	2,136	100%	2,136	0.68	1,452
	Boiler Tune Up, Process	289,664	100%	289,664	0.68	196,971
	Boiler Tune Up, Space Heating	112,170	100%	111,857	0.68	76,063
	Combination Oven	727	100%	728	0.68	495
	Convection Oven	1,458	77%	1,117	0.68	759
	Demand Controlled Ventilation	51,490	100%	51,490	0.68	35,013
	Fryer	16,172	100%	16,172	0.68	10,997
	Griddle	563	100%	563	0.68	383
	High Efficiency Boiler	96,932	99%	96,284	0.68	65,473
	High Efficiency Furnace	3,473	98%	3,408	0.68	2,317
	Infrared Heaters	36,982	100%	36,982	0.68	25,148
	Pasta Cooker	1,380	100%	1,380	0.68	938
	Pipe Insulation	233,723	100%	233,723	0.68	158,932
	Programmable Thermostat	303	100%	303	0.68	206
	Steam Trap	5,952,774	100%	5,954,885	0.68	4,049,322
	Storage Water Heater	702	51%	356	0.68	242
	Weather Stripping	23	100%	23	0.68	16
Program Total		**6,824,979**	**100%**	**6,825,410**	**0.68**	**4,641,279**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.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 Guidehouse team analysis.

Table 4-2. 2019 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	509	127%	645	0.68	439
	Faucet Aerator - Bath Laminar	18,956	100%	18,956	0.68	12,890
	Faucet Aerator - Kitchen	30	100%	30	0.68	20
	Showerheads	821	87%	711	0.68	484
	Spray Valve (Med Sized Restaurants)	344	100%	344	0.68	234
Prescriptive	Boiler Reset Controls	2,136	100%	2,136	0.68	1,452
	Boiler Tune Up, Process	289,531	100%	289,531	0.68	196,881
	Boiler Tune Up, Space Heating	28,828	100%	28,800	0.68	19,584
	Combination Oven	727	100%	728	0.68	495
	Convection Oven	549	69%	381	0.68	259
	Demand Controlled Ventilation	39,450	100%	39,450	0.68	26,826
	Fryer	16,172	100%	16,172	0.68	10,997
	Griddle	563	100%	563	0.68	383
	High Efficiency Boiler	28,360	98%	27,713	0.68	18,845
	High Efficiency Furnace	2,073	99%	2,049	0.68	1,393
	Infrared Heaters	34,727	100%	34,727	0.68	23,614
	Pasta Cooker	1,380	100%	1,380	0.68	938
	Pipe Insulation	527	100%	527	0.68	358
	Programmable Thermostat	303	100%	303	0.68	206
	Steam Trap	5,689,185	100%	5,691,201	0.68	3,870,017
	Storage Water Heater	702	51%	356	0.68	242
	Weather Stripping	23	100%	23	0.68	16
Program Total		**6,155,897**	**100%**	**6,156,727**	**0.68**	**4,186,574**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.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 Guidehouse team analysis.

Table 4-3. 2019 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	1,989	100%	1,995	0.68	1,357
	Faucet Aerator - Kitchen	1,074	100%	1,074	0.68	730
	Showerheads	410	100%	411	0.68	280
	Spray Valve (Med Sized Restaurants)	172	100%	172	0.68	117
Prescriptive	Boiler Tune Up, Process	133	100%	133	0.68	91
	Boiler Tune Up, Space Heating	83,342	100%	83,057	0.68	56,479
	Convection Oven	909	81%	735	0.68	500
	Demand Controlled Ventilation	12,040	100%	12,040	0.68	8,187
	High Efficiency Boiler	68,572	100%	68,572	0.68	46,629
	High Efficiency Furnace	1,401	97%	1,359	0.68	924
	Infrared Heaters	2,255	100%	2,255	0.68	1,533
	Pipe Insulation	233,196	100%	233,196	0.68	158,573
	Steam Trap	263,589	100%	263,683	0.68	179,305
Program Total		**669,082**	**100%**	**668,683**	**0.68**	**454,705**

* Realization Rate (RR) is the ratio of verified gross savings to ex ante gross savings, based on evaluation research findings.
† Net-to-Gross (NTG) is the ratio of verified net savings to verified gross savings. The NTG is a deemed value. Source: Nicor_Gas_NTG_History_and_2019_Recommendations_2018-10-01_Final Aerator Showerhead Correction 2019-04-12.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 Guidehouse 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 all measures with realization rates above or below 100 percent. Appendix 1 provides a description of the impact analysis methodology.

Table 5-1. Verified Gross Savings Parameters

Measure	Unit Basis	Ex Ante Gross (therms/unit)	Verified Gross (therms/unit)	Realization Rate	Data Source(s)‡
Boiler Reset Controls	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.4,† Program Tracking Data (PTD)*
Boiler Tune Up, Process	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.3, PTD
Boiler Tune Up, Space Heating	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.2, PTD
Combination Oven	Each	363.7	364.0	100%	IL TRM v7.0, 4.2.1, PTD
Convection Oven	Each	Varies	Varies	77%	IL TRM v7.0, 4.2.5, PTD
Demand Controlled Ventilation	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.19, PTD
Faucet Aerator - Bath	Each	Varies	Varies	106%	IL TRM v7.0, 4.3.2, PTD
Faucet Aerator - Bath Laminar	Each	Varies	Varies	100%	IL TRM v7.0, 4.3.2, PTD
Faucet Aerator - Kitchen	Each	Varies	Varies	100%	IL TRM v7.0, 4.3.2, PTD
Fryer	Each	Varies	Varies	100%	IL TRM v7.0, 4.2.7, PTD
Griddle	Each	Varies	Varies	100%	IL TRM v7.0, 4.2.8, PTD
High Efficiency Boiler	Each	Varies	Varies	99%	IL TRM v7.0, 4.4.10, PTD
High Efficiency Furnace	Each	Varies	Varies	98%	IL TRM v7.0, 4.4.11, PTD
Infrared Heaters	Each	451.0	451.0	100%	IL TRM v7.0, 4.4.12, PTD
Pasta Cooker	Each	1380.0	1380.0	100%	IL TRM v7.0, 4.2.17, PTD
Pipe Insulation	Ln Ft	Varies	Varies	100%	IL TRM v7.0, 4.4.14, PTD
Programmable Thermostat	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.18, PTD
Showerheads	Each	21.6	Varies	91%	IL TRM v7.0, 4.3.3, PTD
Spray Valve (Med Sized Restaurants)	Each	171.9	171.9	100%	IL TRM v7.0, 4.2.11, PTD
Steam Trap	Each	Varies	Varies	100%	IL TRM v7.0, 4.4.16, PTD
Storage Water Heater	Each	Varies	Varies	51%	IL TRM v7.0, 4.3.1, PTD
Weather Stripping	Each	23.4	23.4	100%	PTD, Nicor Gas Workpaper

* Program Tracking Data (PTD) provided by Nicor Gas, February 4, 2020.
† State of Illinois Technical Reference Manual version 7.0 from http://www.ilsag.info/technical-reference-manual.html.
‡ Project files and monthly billing data provided by Nicor Gas. Site-specific data collected by Guidehouse as needed.
Source: Nicor Gas tracking data and Guidehouse team analysis.

5.2 Findings and Recommendations

5.2.1 Faucet Aerators - Bath

The total verified gross savings realization rate for Faucet Aerators - Bath is 106%. All projects with aerator measures, except for the two that are discussed in this section (PRJ-2115592, PRJ-2239439), had a gross savings realization rate of 100%.

Guidehouse found that PRJ-2115592 was a mid-sized “sit down” restaurant. The faucet annual water usage in TRM v7.0 is 15,768 gallons for that building type. However, the ex ante savings was based on a fast food restaurant value of 9,581 gallons. Nicor Gas maintained that choosing a more conservative estimate of 9,581 usage input for all restaurants is reasonable due to difficulties in consistently determining the difference between a “sit down” and “fast food” restaurant.

Guidehouse also found that the tracking quantity of bathroom aerators installed for PRJ-2115592 appeared high for a single restaurant (18). We requested and received supporting information and agree with the number of faucets installed.

> **Recommendation 1.** Guidehouse agrees that the choice Nicor Gas made to assume a conservative estimate of 9,581 gallons usage input for all restaurants is reasonable. However, when evaluation establishes or confirms the type or condition of facilities, we will apply the most representative operating condition from the TRM. In this case (PRJ-2115592), we confirmed that the facility is a “sit down restaurant” and calculated a gross realization rate of 150%.

Guidehouse calculated a gross savings realization rate of 200% for one project (PRJ-2239439). Guidehouse used an aerator annual usage of 5,000 gallons for building type “Other” because the provided building type “Garage” is not listed in the aerator usage table of TRM v7.0 4.3.2.

> **Recommendation 2.** Guidehouse recommends that the program use building type “Other” for installations at building types not provided in the TRM for this measure.

5.2.2 High Efficiency Furnaces, High Efficiency Boilers

The total verified gross savings realization rate for furnace measures is 98%. Guidehouse found 16 furnace projects in the tracking data, and 14 had a gross savings realization rate of 100%, while the other two had a realization rate of 81% (PRJ-2161271 and PRJ-2242808). The projects with the 81% realization rate used the EFLH value from TRM v6.0 for a warehouse in climate zone 2 (1,357 hours), instead of the TRM v7.0 EFLH which is lower (1,098 hours).

This finding applies to boiler measures, specifically the following Warehouse projects: PRJ-2329970 and PRJ-2335787.

> **Recommendation 3.** Guidehouse recommends that the EFLH values for furnace and boiler measures be updated to align, by building type, with the program year TRM version.

5.2.3 Showerheads

The verified gross savings realization rate for all showerhead measures is 91%. The realization rate for individual showerhead measure installations was 100%, with the exception of 12 showerheads installed in PRJ-2368018. The ex ante savings was 21.6 therms per unit for all showerheads, which assumes a 1.5

gallon per minute (GPM) efficient showerhead. However, for 12 showerheads installed in PRJ-2368018, the reported efficient GPM ("PostInstallationEfficiency") for the model# SHO31W was 2.0 GPM, which was confirmed and used to calculate the verified savings.

Recommendation 4. Guidehouse recommends that the gross unit therm savings use the site-specific GPM ("PostInstallationEfficiency" field) as provided by the model# in the tracking data.

5.2.4 Steam Traps

The program-level verified gross savings realization rate for steam trap measures is 100%. The steam trap measures (Commercial, Dry Cleaner, Industrial) are dependent on the annual operating hours of the steam plant (TRM v7.0). The Dry Cleaner steam trap measures 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.

Guidehouse used the average steam trap inlet pressure in the 'Post-Install Value' field of the tracking data to calculate verified savings. Guidehouse found that one measure did not have a realization rate of 100% (see Table 5-2). The savings discrepancy was not significant enough to change the total realization rate. Nicor Gas stated that the savings discrepancy for PRJ-2441467 was due to a misreported ex ante savings which did not account for the measure quantity being changed from one to two.

Table 5-2. Industrial Steam Traps Projects with Non 100% Realization Rates

Measure	Project ID	Building Type	Ex Ante Unit Therms Savings	Verified Unit Therms Savings*	Gross Therms Realization Rate (RR)
Steam Trap, Indust MP 15-30 psig	PRJ-2441467	Manufacturing	323.91	548.39	200%

* Verified savings are based on tracking system custom hours.

Source: Nicor Gas tracking data and Guidehouse team analysis.

Guidehouse found that the Hours input used in ex ante savings calculations was not consistently reported in the tracking data. Non-commercial measures used the 'Equivalent Full Load Hours' field, but commercial measures used the TRM default hours and did not use the 4,040 hours reported in the 'Equivalent Full Load Hours' field.

Moreover, for one project that installed multiple industrial steam traps (PRJ-2294159), Nicor Gas used 4,392 hours despite reporting 8,760 equivalent full load hours. Guidehouse used the 4,392 hours in verified savings calculations after discussion with Nicor Gas.

Recommendation 5. Nicor Gas should consistently report the Hours input used by ex ante calculations in the tracking data. If a TRM default value is used, the field may be left blank.

The tracking data uses a boiler efficiency of 0.80 for all steam trap projects. The default boiler efficiency for steam boilers (except multi-family low pressure) is 0.807 per TRM v7.0 4.4.16. The value of 0.80 over-estimates savings by approximately one percent.

Recommendation 6. Nicor Gas should use a default boiler efficiency of 0.807 per TRM v7.0 4.4.16, which was used to calculate verified savings.

Guidehouse used a "LeakingAndBlowThru" value of 1.0 for all industrial steam traps, including for PRJ-2338326, which reported a "LeakingAndBlowThru" of 21 (the value should be between 0 and 1).

Recommendation 7. Nicor Gas should ensure that all "LeakingAndBlowThru" inputs are consistent with the TRM or a provide source of custom inputs.

5.2.5 Storage Water Heaters

The program-level verified gross savings realization rate for storage water heater measures is 51%. Guidehouse used the following formulas from TRM v7.0 5.4.2 to calculate the gross therms savings.

Figure 5-1. Storage Water Heater Gross Therms Savings Formulas

$$\Delta Therms_{Storage\ Water\ Heater} = \Delta Therms + \Delta Therms_{Standby}$$

$$\Delta Therms = \frac{(T_{out} - T_{in}) * HotWaterUse_{Gallon} * \gamma Water * 1 * \left(\frac{1}{UEF_{gasbase}} - \frac{1}{UEF_{Eff}}\right)}{100{,}000}$$

$$\Delta Therms_{Standby} = \frac{(SL_{gasbase} - SL_{eff}) * 8766}{100{,}000}$$

$SL_{gasbase}$ = Standby loss of gas baseline unit (Btu/h)

$= Q/800 + 110\sqrt{V}$

Q =Nameplate input rating in Btu/h

V = Rated volume in gallons

SL_{eff} = Nameplate standby loss of new water heater, in Btu/h

Guidehouse was unable to determine the source of the realization rate discrepancies, because there are only two storage water heater projects and each has a different realization rate. Guidehouse used the custom inputs provided in the tracking data and documented the key verified savings inputs below (see Table 5-3). Note that T_{out}, T_{in}, and *yWater* all use TRM default values (125.1, 54.1, and 8.33, respectively).

Table 5-3. Storage Water Heaters Gross Realization Rate

Measure	Project ID	Hot Water Use (Gallons)	$UEF_{gasbase}$	UEF_{Eff}	Nameplate Input Rating (BTU/h)	SL_{eff}	Gross Therms Realization Rate (RR)
Storage Water Heater, >88% TE	PRJ-2352475	56,800	0.8	0.97	199,900	967	32%
Storage Water Heater, >0.67 EF	PRJ-2352506	62,200	0.6	0.95	199,900	1,084	69%

Source: Nicor Gas tracking data and Guidehouse team analysis.

Recommendation 8. Guidehouse recommends that Nicor Gas use the TRM methodologies and inputs described in Figure 5-1 and Table 5-3 for estimating storage water heaters.

5.2.6 Convection Ovens

The total verified gross savings realization rate for convection oven measures was 77%. Guidehouse used the formula in Figure 5-2 from TRM v7 to verify savings. CLEAResult clarified in report comments that the TRM default value (12,000 btu/h) was used. Guidehouse accepted the TRM default value (12,000 btu/h) and disregarded the tracking data value (13,000 btu/h).

Figure 5-2. Convection Oven Gross Therms Savings Formulas

ΔTherms = (ΔDailyIdle Energy + ΔDailyPreheat Energy + ΔDailyCooking Energy) * Days /100000

ΔDailyIdleEnergy = (IdleBase* IdleBaseTime)- (IdleENERGYSTAR * IdleENERGYSTARTime)

ΔDailyPreheatEnergy = (PreHeatNumberBase * PreheatTimeBase / 60 * PreheatRateBase) – (PreheatNumberENERGYSTAR * PreheatTimeENERGYSTAR/60 * PreheatRateENERGYSTAR)

ΔDailyCookingEnergy = (LB * EFOOD/ EffBase) - (LB * EFOOD/ EffENERGYSTAR)

Guidehouse used the inputs from the tracking data fields to calculate savings which produced lower gross realization rates as shown below.

Table 5-4. Convection Ovens Gross Realization Rate

Measure	Project ID	ΔDailyIdle Energy	ΔDailyPreheat Energy	ΔDailyCooking	Ex Ante Unit Therms Savings	Verified Unit Therms Savings	Gross Therms Realization Rate (RR)
Convection Oven, E >46%	PRJ-2338347	59,400	8,000	35,256	548.8	375.0	68%
Convection Oven, E >46%	PRJ-2391228	59,400	8,000	37,037	548.9	381.5	69%
Convection Oven, E >46%	PRJ-2441171	59,400	8,000	31,250	360.3	360.3	100%

Source: Nicor Gas tracking data and Guidehouse team analysis.

Recommendation 9. Nicor Gas should use the inputs provided in the tracking data to calculate the gross therms savings for convection ovens.

5.2.7 Demand Controlled Ventilation

The program-level verified gross savings realization rate for demand controlled ventilation measures was 100%. There are two demand controlled ventilation measures: DCV and Kitchen Demand Ventilation Controls. For the two Kitchen Demand Ventilation Controls projects (PRJ-2283604, PRJ-2339101), Guidehouse used 20 HP for PRJ-2283604 and 12.5 HP for PRJ-2339101 per comments provided by CLEAResult and Nicor Gas. These HP values were not provided in the final tracking data.

Recommendation 10. Custom inputs used for horsepower (HP) or heating efficiency ("actual if known" is allowed by the TRM for both inputs) d should be provided in the tracking data.

5.2.8 Weather Stripping

The ex ante savings for the weather stripping measure are based on a custom workpaper because the measure was not in TRM v7.0. There was one measure with 23.4 therms savings. The total verified savings realization rate for weather stripping is 100%. Guidehouse verified the ex ante method and savings.

Recommendation 11. In 2020, Nicor Gas should use TRM v8.0 (4.8.16) to calculate weather stripping savings and use a measure life of 10 years.

6. Appendix 1. Impact Analysis Methodology

Guidehouse determined verified gross savings for each program measure by conducting a tracking system review. Guidehouse checked that measure algorithms and inputs matched deemed IL TRM (v7.0) inputs and validated custom inputs or adjusted as necessary.[1] Verified gross realization rates are calculated by dividing the verified gross savings by the ex ante gross savings.

[1] Illinois Statewide Technical Reference Manual for Energy Efficiency Version 7.0 from http://www.ilsag.info/technical-reference-manual.html

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

Table 7-1 shows the Total Resource Cost (TRC) cost-effectiveness analysis inputs available at the time of drafting this impact evaluation report. Additional required cost data (e.g., measure costs, program level incentive, and non-incentive costs) are not included in this table and will be provided to the evaluation team later.

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)
Boiler Reset Controls	Each	2	20	2,136	2,136	1,452
Boiler Tune Up, Process	Each	21	3	289,664	289,664	196,971
Boiler Tune Up, Space Heating	Each	94	3	112,170	111,857	76,063
Combination Oven	Each	2	12	727	728	495
Convection Oven	Each	3	12	1,458	1,117	759
Demand Controlled Ventilation	Each	94	10	51,490	51,490	35,013
Faucet Aerator - Bath	Each	364	10	2,498	2,640	1,795
Faucet Aerator - Bath Laminar	Each	535	10	18,956	18,956	12,890
Faucet Aerator - Kitchen	Each	122	10	1,104	1,104	751
Fryer	Each	11	12	16,172	16,172	10,997
Griddle	Each	3	12	563	563	383
High Efficiency Boiler	Each	34	20	96,932	96,284	65,473
High Efficiency Furnace	Each	16	16.5	3,473	3,408	2,317
Infrared Heaters	Each	82	12	36,982	36,982	25,148
Pasta Cooker	Each	1	12	1,380	1,380	938
Pipe Insulation	Ln Ft	8,834	15	233,723	233,723	158,932
Programmable Thermostat	Each	8	8	303	303	206
Showerheads	Each	57	10	1,231	1,122	763
Spray Valve (Med Sized Restaurants)	Each	3	5	516	516	351
Steam Trap	Each	2,288	6	5,952,774	5,954,885	4,049,322
Storage Water Heater	Each	2	15	702	356	242
Weather Stripping	Unknown	1	10	23	23	16
Total			6.4	**6,824,979**	**6,825,410**	**4,641,279**

Source: Nicor Gas tracking data and Guidehouse team analysis.