



# **Total Resource Cost (TRC) Test Results**

**Final**

**First Triennial  
Natural Gas Energy Efficiency Plan:  
(6/1/2011-5/31/2014)**

**Presented to  
Nicor Gas**

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## Table of Contents

<b>1.</b>	<b>Executive Summary .....</b>	<b>1</b>
<b>2.</b>	<b>Overview .....</b>	<b>4</b>
2.1	IL TRC Equation.....	4
2.2	UCT Equation .....	5
2.3	Cost-Effectiveness Data Requirements.....	6
<b>3.</b>	<b>Summary of Results &amp; Generic Data Points .....</b>	<b>8</b>
3.1	Generic Data Points.....	9
3.2	Avoided Gas Production Costs (\$/therm).....	10
3.3	Avoided Water Use.....	10
3.4	Non-Incentive Costs.....	10
3.5	Incentives.....	11
3.6	Incremental Costs .....	11
3.7	Discount Rate .....	12
3.8	Avoided CO <sub>2</sub> Emissions .....	12
3.9	Miscellaneous Portfolio Costs.....	13
<b>4.</b>	<b>Program Specific Data.....</b>	<b>14</b>
4.1	Program Specific Data Review .....	16
4.2	Heating & Appliance Incentive .....	16
4.3	Single Family Retrofit .....	18
4.4	Multi-Family Comprehensive Energy Efficiency Program .....	21
4.5	Residential New Construction.....	24
4.6	Elementary Energy Education.....	25
4.7	Behavioral Energy Savings Program .....	27
4.8	Business Incentive .....	29
4.9	Business Custom .....	32
4.10	Economic Redevelopment.....	33
4.11	Retro-Commissioning.....	35
4.12	Small Business Direct Install Program .....	37
4.13	Business New Construction Service .....	40

## List of Figures and Tables

Figure 1 – Summary of Portfolio Level Benefits and Costs.....	9
Table 2-1 - Data points needed to conduct TRC .....	7
Table 3-1 – Summary of Portfolio Level Costs and Benefits (\$ in 000’s) .....	8
Table 3-2 - Summary of Generic Data Points Used for TRC .....	10
Table 4-1 - Summary of Program Level Benefits, Costs (\$ in 000’s) and IL TRC Test (GHG @ \$27.50/ton) – .....	14
Table 4-2. Summary of Program Level Benefits, Costs (\$ in 000’s) and Utility Cost Test–.....	15
Table 4-3. IL TRC Components for Heating & Appliance Incentive Program.....	17
Table 4-4. Measure life of the Heating & Appliance Incentive Program Measures.....	17
Table 4-5. Incremental Cost of the of the Heating & Appliance Incentive Program Measures .....	18
Table 4-6. Heating & Appliance Incentive GPY1-GPY3 Impact Results .....	18
Table 4-7. IL TRC Components for Single Family Retrofit .....	19
Table 4-8. Measure life of the Single Family Retrofit Program Measures.....	19
Table 4-9. Incremental Cost of the of the Single Family Retrofit Program Measures.....	20
Table 4-10. Single Family Retrofit GPY1-GPY3 Impact Results .....	20
Table 4-11. IL TRC Components for Multi-Family Comprehensive Energy Efficiency Program GPY1- GPY3.....	21
Table 4-12. Measure life of the Multi-Family Comprehensive Energy Efficiency Program Measures .....	22
Table 4-13. Incremental Cost of the of the Multi-Family Comprehensive Energy Efficiency Measures ....	23
Table 4-14. Multi-Family Comprehensive Energy Efficiency Program GPY1-GPY3 Impact Results .....	24
Table 4-15. IL TRC Components for Residential New Construction.....	24
Table 4-16. Residential New Construction GPY1-GPY3 Impact Results.....	25
Table 4-17. IL TRC Components for Elementary Energy Education .....	26
Table 4-18. Elementary Energy Education GPY1-GPY3 Impact Results.....	27
Table 4-19. IL TRC Components for BESP Program .....	28
Table 4-20. BESP GPY1-GPY3 Impact Results .....	29
Table 4-21. IL TRC Components for Business Incentive Program .....	29
Table 4-22. Measure life of the Business Incentive Program Measures.....	30
Table 4-23. Incremental Cost of the of the Business Incentive Program Measures .....	31
Table 4-24. Business Incentive Program GPY1-GPY3 Impact Results.....	32
Table 4-25. IL TRC Components for Business Custom Program .....	32
Table 4-26. Business Custom GPY1-GPY3 Impact Results.....	33
Table 4-27. IL TRC Components for Economic Redevelopment Program .....	34
Table 4-28. Economic Redevelopment GPY1-GPY3 Impact Results.....	35
Table 4-29. IL TRC Components for Business Retro-Commissioning Program .....	36
Table 4-30. Retro-Commissioning GPY1-GPY3 Impact Results.....	37
Table 4-31. IL TRC Components for Direct Install Program.....	37
Table 4-32. Measure life of the Direct Install Program Measures .....	38
Table 4-33. Incremental Cost of the of the Direct Install Program Measures .....	39
Table 4-34. Direct Install Program GPY1-GPY3 Impact Results.....	39
Table 4-35. IL TRC Components for Business New Construction Service.....	40
Table 4-36 Business New Construction Service GPY1-GPY3 Impact Results .....	41

## 1. Executive Summary

This report summarizes findings regarding the cost-effectiveness of the Nicor Gas portfolio of energy efficiency programs during the three year time period from program year one through program year three. The calculations and results are to inform future planning for the implementation of efficiency programs, as well as to ensure Nicor Gas met its regulatory responsibility to implement a cost effective portfolio of energy efficiency programs during the three year period.

Navigant's evaluation of the cost effectiveness of the Nicor Gas energy efficiency portfolio includes five tests, including four variations on the Total Resource Cost Test for GHG emissions:

- Utility Cost Test (UCT)
- TRC Test Results with no avoided GHG emission benefits
- IL TRC Test scenario 1, which includes a value of avoided GHG emissions of \$27.50 per ton of CO<sub>2</sub>
- IL TRC Test scenario 2, which includes a value of avoided GHG emissions of \$55 per ton of CO<sub>2</sub>
- IL TRC Test scenario 3, which includes a value of avoided GHG emissions of \$55 per ton of CO<sub>2</sub>, but delayed for three years after measure installation

Importantly, the Nicor Gas portfolio is cost-effective under all five tests performed by Navigant, the results of which are presented in Chapter 2 of this report. The various cost-effectiveness tests and assumptions employed are meant to give a range of perspectives on the cost-effectiveness of the Nicor Gas portfolio under different scenarios. In particular, the four variations on the TRC test encompass a range of assumptions regarding the dollar value of avoided greenhouse gas (GHG) emissions. This development and analysis of scenarios for CO<sub>2</sub> emissions costs follows concepts set forth in the Illinois Commerce Commission's (ICC) May 24, 2011, order in Case 10-0562, page 44. Per the same ICC order, all TRC calculations also include dollar benefits associated with the value of avoided water usage. These values are based on deemed algorithms in the Illinois Technical Reference Manual (TRM) and a weighted average calculation of retail water costs in Nicor Gas service territory.



Table ES-1 summarizes the annual and three-year combined results for the Nicor Gas portfolio at the program, sector, and portfolio levels. The results presented in this table are based on the IL TRC Scenario 1 utilizing a value of \$27.50 per ton of avoided CO<sub>2</sub> emissions, which is the primary test utilized by Navigant for ascertaining the portfolio's cost effectiveness. The results show that across the entire three year period, the portfolio was cost effective with a TRC ratio of 2.11, which breaks down to 1.92 for the Residential sector and 3.65 for the Commercial and Industrial sector. Additionally, all programs were cost effective over the three year period, and there were only three instances where individual programs were not cost-effective in individual years, none of which occurred in PY3.

**Table ES-1. Annual and Three-year Summary of IL TRC Results for Nicor Gas (GHG @ \$27.50/ton)**

*– Nicor Specific w/o Electric Data from Joint Programs*

Program	GPY1			GPY2			GPY3			Combined GPY1 - GPY3		
	NPV Benefits	NPV Costs	IL TRC	NPV Benefits	NPV Costs	IL TRC	NPV Benefits	NPV Costs	IL TRC	NPV Benefits	NPV Costs	IL TRC
<b>Multi-Family Retrofit</b>	\$ 9,778,597	\$ 863,639	11.32	\$ 6,048,752	\$ 1,313,668	4.61	\$ 41,711,936	\$ 13,119,172	3.15	\$ 57,539,284	\$ 15,296,479	3.76
<b>Heating &amp; Appliance Incentive</b>	\$ 11,571,411	\$ 11,534,393	1.00	\$ 19,982,383	\$ 19,087,249	1.05	\$ 70,425,513	\$ 35,215,863	2.00	\$ 101,979,306	\$ 65,837,505	1.55
<b>Single Family Retrofit</b>	\$ 993,897	\$ 1,296,595	0.77	\$ 2,500,644	\$ 2,011,845	1.25	\$ 3,856,950	\$ 3,203,958	1.20	\$ 7,351,490	\$ 6,512,398	1.13
<b>Elementary Energy Education</b>	\$ 1,181,558	\$ 395,407	2.99	\$ 2,713,340	\$ 465,314	5.83	\$ 4,481,812	\$ 880,673	5.09	\$ 8,376,709	\$ 1,741,394	4.81
<b>Behavioral Energy Savings</b>				\$ 17,579	\$ 1,178,149	0.01	\$ 3,791,294	\$ 2,100,790	1.81	\$ 3,808,873	\$ 3,278,938	1.16
<b>Residential New Construction</b>				\$ 2,080,566	\$ 1,387,901	1.19	\$ 2,227,674	\$ 1,491,589	1.91	\$ 4,308,240	\$ 2,879,490	1.50
<b>All Residential</b>	\$ 23,525,462	\$ 14,090,034	1.67	\$ 33,343,263	\$ 25,444,125	1.31	\$ 126,495,179	\$ 56,012,045	2.26	\$ 183,363,904	\$ 95,546,204	1.92
<b>Economic Redevelopment</b>	\$ 6,481	\$ 46,984	0.14	\$ 732,006	\$ 646,185	1.13	\$ 561,616	\$ 273,853	2.05	\$ 1,300,103	\$ 967,023	1.34
<b>Retro-Commissioning</b>	\$ 603,330	\$ 389,987	1.55	\$ 1,739,999	\$ 671,955	2.64	\$ 4,272,974	\$ 1,338,010	3.19	\$ 6,616,304	\$ 2,399,953	2.76
<b>Custom Business</b>	\$ 8,949,160	\$ 2,772,075	3.32	\$ 34,378,193	\$ 12,278,975	2.80	\$ 45,401,609	\$ 16,441,004	2.76	\$ 88,728,962	\$ 31,492,054	2.82
<b>Business New Construction</b>	\$ 245,929	\$ 66,777	3.68	\$ 1,852,167	\$ 487,011	3.73	\$ 1,536,983	\$ 695,794	2.21	\$ 3,635,080	\$ 1,249,583	2.91
<b>Small Business Direct Install</b>	\$ 657,457	\$ 447,770	1.47	\$ 11,241,275	\$ 1,393,037	8.07	\$ 16,871,315	\$ 3,010,285	5.62	\$ 28,770,048	\$ 4,851,093	5.93
<b>Business Incentive</b>	\$ 6,617,254	\$ 1,194,778	5.54	\$ 13,013,660	\$ 2,862,532	4.55	\$ 47,745,090	\$ 8,797,644	5.42	\$ 67,376,003	\$ 12,854,953	5.24
<b>All C&amp;I</b>	\$ 17,079,611	\$ 4,918,372	3.47	\$ 62,957,300	\$ 18,339,696	3.43	\$ 116,389,588	\$ 30,556,591	3.81	\$ 196,426,500	\$ 53,814,658	3.65
<b>Portfolio-level Costs</b>		\$ 8,978,045			\$ 10,945,192			\$ 10,416,963			\$ 30,340,200	
<b>Total</b>	\$ 40,605,074	\$ 27,986,451	1.45	\$ 96,300,563	\$ 54,729,013	1.76	\$ 242,884,766	\$ 96,985,598	2.50	\$ 379,790,403	\$ 179,701,062	2.11

Source: Navigant Analysis



Though annual results are included in Table ES-1, the remainder of the report focuses on the combined three-year results, per regulatory requirements. Summary results for all five tests, including three GHG scenarios for the IL TRC test are presented in Chapter 2.

## 2. Overview

As part of Navigant’s evaluation of Nicor Gas Company’s (Nicor) energy efficiency programs for gas program years one through three, we performed cost-benefit calculations based upon a combination of assumptions made by Nicor Gas, program tracking data, and other available resources. The focus of this review is on the basis and calculations used to conduct the Illinois TRC test, but the inputs and results for the Utility Cost Test (UCT) are also reported.

The Illinois TRC test is defined in the Illinois Compiled Statutes (ILCS) Section 8-104b as follows:

"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 regulation of emissions of greenhouse gases.<sup>1</sup>

The Illinois TRC test differs from traditional TRC tests in its requirement to include a reasonable estimate of the financial costs associated with future regulations and legislation on the emissions of greenhouse gases (GHG). This difference adds an additional benefit to investments in efficiency programs that are typically included in the Societal Test in other jurisdictions. However, the Illinois TRC test differs from the Societal test in that it only includes benefits associated with avoided GHGs and the discount rate applied to future benefits is the gas utilities Weighted Average Cost of Capital (WACC), which is typically used in TRC calculations, as opposed to a societal discount rate.

### 2.1 IL TRC Equation

The equation used to calculate the Illinois TRC is presented below:

#### Equation 1 – Illinois TRC

$$BCR_{ILTRC} = B_{ILTRC} / C_{ILTRC}$$

Where,

<b><math>BCR_{ILTRC}</math></b>	=	Benefit-cost ratio of the Illinois Total Resource Cost test
<b><math>B_{ILTRC}</math></b>	=	Present value of benefits of a Illinois program or portfolio
<b><math>C_{ILTRC}</math></b>	=	Present value of costs of a Illinois program or portfolio

<sup>1</sup> Illinois Compiled Statutes Section 8-104b.

The benefits of the Illinois TRC are calculated using the following equation:

**Equation 2 – IL TRC Benefits**

$$B_{ILTRC} = \sum_{t=1}^N \frac{UAEP_t + UATD_t + EB_t}{(1+d)^{t-1}} + \sum_{t=1}^N \frac{UAC_{at} + PAC_{at}}{(1+d)^{t-1}}$$

The costs of the Illinois TRC are calculated using the following equation:

**Equation 3 - IL TRC Costs**

$$C_{ILTRC} = \sum_{t=1}^N \frac{PRC_t + PIC_t + PEAM_t + PCN_t + UIC_t}{(1+d)^{t-1}}$$

Where benefits are defined as:

- UAEP<sub>t</sub> = Utility avoided energy production costs in year t
- UATD<sub>t</sub> = Utility avoided transmission and distribution costs in year t
- EB<sub>t</sub> = Environmental Benefits in year t
- UAC<sub>at</sub> = Utility avoided supply costs for the alternate fuel in year t
- PAC<sub>at</sub> = Participant avoided costs in year t for alternate fuel devices

And costs are defined as:

- PRC<sub>t</sub> = Program Administrator program costs in year t
- PIC<sub>t</sub> = Program Implementation costs in year t
- PEAM<sub>t</sub> = Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t
- PCN = Net Participant costs
- UIC<sub>t</sub> = Utility increased supply costs in year t
- d = Utility weighted average cost of capital, used as discount rate

**2.2 UCT Equation**

The results of the Utility Cost Test are also presented in Chapter 2 of this report. The UCT (a subset of the Program Administrator Cost Test) approaches cost effectiveness from the perspective of the utility. It determines whether the energy supply and capacity costs avoided by the utility exceed the overhead and cost outlays that the utility incurred to implement energy efficiency programs. The structure of the calculation is similar to the IL TRC, with a few key changes. Since the UCT is primarily focused on utility outlays, incentives paid by the utility to either participants or third party implementers are included in the calculation in place of incremental or participant costs. Additionally, since non-energy benefits accrue to society rather than to the utility implementing energy efficiency programs, these benefits are not included in the UCT formula.

Using the equation terms previously defined for the IL TRC equation, the UCT equation is defined as:

**Equation 4 – UCT**

$$BCR_{UCT} = B_{UCT} / C_{UCT}$$

Where,

- BCR<sub>UCT</sub>** = Benefit-cost ratio of the Utility Cost Test
- B<sub>UCT</sub>** = Present value of benefits to a utility of a program or portfolio
- C<sub>UCT</sub>** = Present value of costs to a utility of a program or portfolio

The benefits of the UCT are calculated using the following equation:

**Equation 5 – UCT Benefits**

$$B_{UCT} = \sum_{t=1}^N \frac{UAEP_t + UATD_t}{(1+d)^{t-1}} + \sum_{t=1}^N \frac{UAC_{at}}{(1+d)^{t-1}}$$

The costs of the UCT are calculated using the following equation:

**Equation 6 - UCT Costs**

$$C_{UCT} = \sum_{t=1}^N \frac{PRC_t + PIC_t + PEAM_t + PIN_t + UIC_t}{(1+d)^{t-1}}$$

Where the new term, *PIN<sub>t</sub>*, is defined as the program incentives provided by the utility in year t.

### 2.3 Cost-Effectiveness Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 2-1 below and are divided into generic and program specific categories. The program specific data points are further subdivided into those that are provided by Nicor Gas prior to program implementation versus those that are a result of the Navigant’s evaluation activities.

**Table 2-1 - Data points needed to conduct TRC**

Category	Data Point	Source
Generic	<ul style="list-style-type: none"> <li>• Avoided Energy Costs (\$/therm)</li> <li>• Discount Rate</li> <li>• Escalation Rates</li> <li>• GHG Cost Assumptions</li> </ul>	Nicor Gas
Program Specific	<ul style="list-style-type: none"> <li>• Participants / Measure Count</li> <li>• Verified Ex-Post Energy Savings</li> <li>• Realization Rate</li> <li>• Net to Gross Ratio</li> </ul>	Navigant
	<ul style="list-style-type: none"> <li>• Measure life</li> <li>• Water Savings</li> <li>• Non-Incentive Costs</li> <li>• Utility Incentive Costs</li> <li>• Incremental Costs (Gross)</li> <li>• Incremental Costs (Net)</li> </ul>	Nicor Gas/ Other

*Source: Navigant analysis*

This document provides a summary of the results at the portfolio and program level, the program specific inputs and range of assumptions, a description of each of the data points and the basis of their determination.

### 3. Summary of Results & Generic Data Points

A summary of the portfolio level results, separated by benefits and cost components, is presented in Table 3-1 and Figure 1 below. Note that the primary difference between the results of the TRC Test and the IL TRC Tests are the added benefits of avoided GHG emissions in the IL TRC Test. In total, the table and figure present five different scenarios for the cost-effectiveness of the Nicor Gas portfolio:

- Utility Cost Test (UCT) Results
- Total Resource Cost (TRC) Test Results with no avoided GHG emission benefits
- IL TRC scenario 1, which includes a value of avoided GHG emissions of \$27.50 per ton of CO<sub>2</sub>. This is the primary scenario used for reporting purposes throughout the report.
- IL TRC scenario 2, which includes a value of avoided GHG emissions of \$55 per ton of CO<sub>2</sub>
- IL TRC scenario 3, which includes a value of avoided GHG emissions of \$55 per ton of CO<sub>2</sub>, but delayed for three years after measure installation.

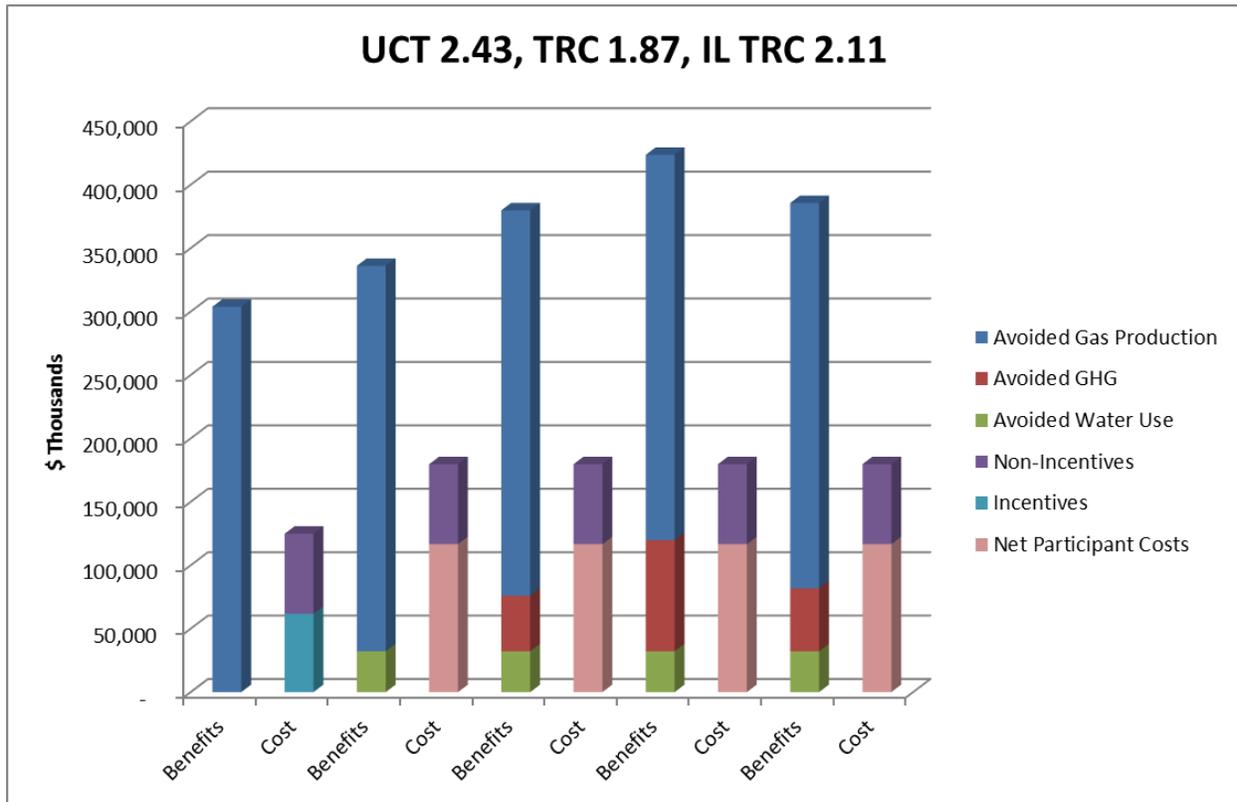
The calculations show the portfolio to be cost effective under all scenarios.

**Table 3-1 – Summary of Portfolio Level Costs and Benefits (\$ in 000's)**

	UCT Test		TRC Test (GHG @ \$0)		IL TRC Scenario 1 (GHG @ \$27.50/ton)		IL TRC Scenario 2 (GHG @ \$55/ton)		IL TRC Scenario 3 (GHG @ \$55/ton delayed)	
	Benefits	Cost	Benefits	Cost	Benefits	Cost	Benefits	Cost	Benefits	Cost
Avoided Gas Production	303,789		303,789		303,789		303,789		303,789	
Avoided GHG					43,778		87,556		49,588	
Avoided Water Use			32,224		32,224		32,224		32,224	
Non-Incentives		63,026		63,026		63,026		63,026		63,026
Incentives		61,825								
Net Participant Costs				116,675		116,675		116,675		116,675
Present Value Totals	303,789	124,852	336,013	179,701	379,790	179,701	423,568	179,701	385,600	179,701
Ratio	2.43		1.87		2.11		2.36		2.15	

Source: Navigant Analysis

Figure 1 – Summary of Portfolio Level Benefits and Costs



Source: Navigant Analysis

As shown in Figure 1, the majority of the benefits in the UCT and TRC tests are derived from avoided gas production, which includes both gas commodity purchases and distribution costs. The value of avoided water use also contribute to overall portfolio benefits. For the comparison to the standard TRC test shown above, as the adder for the value of avoided gas production increases in the IL TRC, so too does the cost-effectiveness of the portfolio.

On the cost side, net participant costs represent the largest component followed by the non-incentive costs of program implementation, such as administration, marketing, and EM&V. For the UCT, the sum of all incentives provided is used in place of net participant costs. The sum of all incentives is less than the sum of all net incremental costs. Therefore, the UCT test ratio of 2.43 exceeds both the TRC ratio of 1.87 and the IL TRC ratio of 2.11.

### 3.1 Generic Data Points

Table 3-2 shows the values for the general data points used all the cost-benefit calculations for all programs and the portfolio. The table is followed by a description of what each of the component represents and how it is sourced.

**Table 3-2 - Summary of Generic Data Points Used for TRC**

Data Point	Value
Avoided Gas Production (\$/therm)	\$0.777 - \$0.920 (in 2013)
Discount Rate (Utility WACC %)	8.09%
Avoided Water Use (\$/1,000 gallons)	\$4.40 (2013 base year)
Avoided CO <sub>2</sub> Emissions	\$27.50/ton (base scenario)

*Source: Navigant analysis*

### 3.2 Avoided Gas Production Costs (\$/therm)

Avoided gas production costs are those associated with purchasing natural gas and distributing it to end-use customers. As part of its filed Plan, Nicor Gas calculated natural gas commodity prices at Henry Hub, using the Wood Mackenzie Natural Gas Forecast, Long Term View. Nicor Gas calculated avoided supply costs by adding the pipeline delivery and gas basis charges required to transport gas from Henry Hub to the Chicago city gate, the variable distribution charges required to distribute gas from the city gate to customers, and the state taxes incurred by customers. A trend analysis was utilized to extend gas prices beyond that which is included in the forecast.

### 3.3 Avoided Water Use

Certain measures such as aerators and low flow fixtures help conserve on participant water usage. Accordingly, on account of the water conservation these measures generate, there are additional economic benefits. To account for these economic benefits, Nicor Gas constructed an index of municipal water rates for the 22 largest municipalities in the service territory. In the Nicor Gas service territory water costs participants \$4.40 per 1,000 gallons in 2013, using an average weighted by population. Throughout the period of the forecast the water rate index is inflated at 4.78% per year based on historic inflation for water utilities tracked by the U.S. Department of Labor.

### 3.4 Non-Incentive Costs

Non-incentive costs are program administrator costs (related to energy efficiency) that are not otherwise classified as financial incentives paid to customers or incentives paid to third parties. In other words, non-incentive costs are equal to all program administrator costs minus incentives.

Examples of non-incentive costs include:

- Costs for overhead, labor and materials required to develop, deliver, and administer functions related to the implementation of energy efficiency programs or portfolio. This can include such things as rebate processing, measurement and verification, quality assurance, advertising and marketing, or customer relations, among others.
- Program administrator payment to a third party whose principal purpose is not to reduce the cost of the efficient measure to the customer.
- Program administrator payment to a third party to cover the cost of services that are principally intended to be a form of marketing, as opposed to being truly necessary for any customer implementation of efficient measures, should be classified as non-incentive costs.

### 3.5 Incentives

Incentives<sup>2</sup> include financial incentives paid to customers plus incentives paid to third parties. Financial Incentives Paid to Customers means payment<sup>3</sup> made by a program administrator directly to an end-use Customer to encourage the Customer to participate in an efficiency Program and offset some or all of the Customer’s costs to purchase and install a qualifying efficient Measure, ultimately resulting in a reduction in the net price paid by the Customer for the efficient Measure. This rebate type of Incentive is often referred to as a downstream incentive which has the result that the net price to the Customer of an Energy Efficiency Program-sponsored Measure is reduced by the amount of the Incentive.

Incentives paid to third parties means payment made by a program administrator to a third party that is principally intended to reduce the net price to the customer of purchasing and installing a qualifying efficient Measure. Incentives paid to third parties include payments made by a program administrator to trade allies, manufacturers, wholesalers, distributors, contractors, builders, retailers, implementation contractors, or other non-customer stakeholders that are principally intended to defray the incremental cost to the customer of purchasing and installing an efficient measure. Incentives paid to third parties also includes payment made by a program administrator to an implementation contractor to cover the full cost of direct installation measures (materials and labor), for the portion not covered by the customer, or the full cost of study-based services that are truly necessary for a customer to implement efficient measures, as opposed to being principally intended to be a form of marketing.

### 3.6 Incremental Costs

Incremental costs means the difference between the cost of the efficient measure and the cost of the most relevant baseline measure that would have been installed (if any) in the absence of the efficiency Program. Installation costs (material and labor) and Operations and Maintenance (O&M) costs shall be included if there is a difference between the efficient measure and the baseline measure. In cases where the efficient measure has a significantly shorter or longer life than the relevant baseline measure, the avoided baseline replacement measure costs should be accounted for in the TRC analysis. The incremental cost input in the TRC analysis is not reduced by the amount of any incentives.

Examples of incremental cost calculations include:

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<sup>2</sup> The Illinois TRC test requires that “all incremental costs of end use measures (including both utility and participant contributions)” should be reflected as costs in the TRC test calculation. As long as we ensure that “all incremental costs of end-use measures” is included in the TRC test calculation, there is no need to add Program Administrator Contribution costs (i.e., Incentives) and Participant Contribution costs as separate components to the TRC test. However, Program Administrator Contribution costs (i.e., Incentives) are needed for purposes of calculating the Program Administrator Cost Test/Utility Cost Test (PACT/UCT) since those are a component of the Program Administrator expenses. Most TRC modeling software requires users to input the Incentives as a separate input in addition to providing all Incremental Costs such that the PACT/UCT can be calculated; for this reason, the separate Incentives input in the TRC model is not “used” when calculating the TRC test because these costs are already reflected in the Incremental Cost input, and if the model were to use both the Incentives input and the Incremental Cost input, it would result in double counting of costs in the TRC analysis.

<sup>3</sup> Payments include both Incentive checks and gift cards that are not restricted to specific retailers. Any fees incurred by the Program Administrator to obtain gift cards should be classified as Non-Incentive Costs because such fees are not principally intended to reduce the net price to the Customer of purchasing and installing the qualifying efficient Measure.

- The incremental cost for an efficient measure that is installed in new construction or is being purchased at the time of natural installation, investment, or replacement is the additional cost incurred to purchase an efficient measure over and above the cost of the baseline/standard (i.e., less efficient) measure (including any incremental installation, replacement, or O&M costs if there is a difference between the efficient measure and baseline measure).
- For a retrofit measure where the efficiency program caused the customer to update their existing equipment, facility, or processes, where the customer would not have otherwise made a purchase, the appropriate baseline is zero expenditure, and the incremental cost is the full cost of the new retrofit measure (including installation costs).
- For the early replacement of a functioning measure with a new efficient measure, where the customer would not have otherwise made a purchase for a number of years, the appropriate baseline is a dual baseline that begins as the existing measure and shifts to the new standard measure after the expected remaining useful life of the existing measure ends. Thus, the incremental cost is the full cost of the new efficient measure (including installation costs) being purchased to replace a still-functioning measure less the present value of the assumed deferred replacement cost of replacing the existing measure with a new baseline measure at the end of the existing measure's life.
- For study-based services that are truly necessary for a customer to implement efficient measures, as opposed to being principally intended to be a form of marketing, the incremental cost is the full cost of the study-based service.
- For the early retirement of duplicative functioning equipment before its expected life is over (e.g., appliance recycling programs), the incremental costs are composed of the customer's value placed on their lost amenity, any customer transaction costs, and the pickup and recycling cost. The incremental costs include the actual cost of the pickup and recycling of the equipment because this is assumed to be the cost of recycling the equipment that would have been incurred by the customer if the customer were to recycle the equipment on their own in the absence of the efficiency program. The payment a program administrator makes to the customer serves as a proxy for the value the customer places on their lost amenity and any customer transaction costs.

### 3.7 Discount Rate

The discount rate is an important determinant of overall cost effectiveness. The avoided energy production, avoided water use, and GHG benefits accrue over the life of the measures included in each program. These benefits are discounted to determine the present value of the cumulative benefits. The discount rate used of 8.09% reflects Nicor Gas's weighted average cost of capital (WACC) and is the appropriate rate to use for cost-benefit testing.

### 3.8 Avoided CO<sub>2</sub> Emissions

The development and analysis of scenarios for CO<sub>2</sub> emissions costs and water savings followed concepts set forth in the ICC's May 24, 2011, order in Case 10-0562, page 44. For the cost-effectiveness calculations, Navigant ran four scenarios for the value of avoided GHG emissions:

- A value of avoided GHG emissions of \$0.00 per ton of CO<sub>2</sub>, effective beginning in the first year of measure installation.

- A value of avoided GHG emissions of \$27.50 per ton of CO<sub>2</sub>, effective beginning in the first year of measure installation. This is the base scenario used for reporting purposes throughout the report.
- A value of avoided GHG emissions of \$55.00 per ton of CO<sub>2</sub>, effective beginning in the first year of measure installation.
- A value of avoided GHG emissions of \$55.00 per ton of CO<sub>2</sub>, but delayed for three years after measure installation.

These scenarios show how sensitive the cost-effectiveness of the portfolio is to prospective prices on the cost of GHG emissions. The sensitivity analysis showed that the portfolio was cost effective under all carbon pricing scenarios.

### **3.9 Miscellaneous Portfolio Costs**

In addition to costs allocated directly to energy efficiency programs, portfolio level costs not directly incurred by specific programs are also included. These costs may include administrative, research and development, outreach, advertising, evaluation, measurement, and verification, legal, and other expenses. This also includes costs for two programs, Building Performance with ENERGY STAR and Emerging Technology, which were not evaluated separately due to non-existent or trivial savings. Since statutory costs effectiveness is measured at the portfolio level, Nicor Gas does not allocate these costs to individual programs.

## 4. Program Specific Data

A summary of the components of the cost effectiveness calculations for each program are shown in Table 4-1 for the Illinois TRC calculations and Table 4-2 for the Utility Cost Test calculations. The tables include the value of each benefit and cost component for each program, as well as portfolio level totals for each component.

**Table 4-1 - Summary of Program Level Benefits, Costs (\$ in 000's) and IL TRC Test (GHG @ \$27.50/ton) –  
Nicor Specific w/o Electric Data from Joint Programs**

Program  (a)	Benefits				Costs				IL Total Resource Cost (TRC) Test			
	Avoided Energy Production	Avoided Water Use	Other Benefits	Definition of Other Benefits	Non-Incentive Costs	Incentive Costs	Incremental Costs (Gross)	Incremental Costs (Net)	IL TRC Benefits	IL TRC Costs	IL TRC Test Net Benefits	IL TRC Test
	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j) = (b+c+d)	(k) = (f+i)	(l) = (j-k)	(m) = (j/k)
Multi-Family Retrofit	\$ 43,029,312	\$ 8,787,330	\$ 5,722,642	Avoided GHGs	\$ 3,897,734	\$ 11,934,204	\$ 12,146,437	\$ 11,398,744	\$ 57,539,284	\$ 15,296,479	\$ 42,242,806	3.76
Heating & Appliance Incentive	\$ 78,494,998	\$ 17,420,895	\$ 6,063,414	Avoided GHGs	\$ 9,677,971	\$ 19,152,664	\$ 75,675,781	\$ 56,159,534	\$ 101,979,306	\$ 65,837,505	\$ 36,141,801	1.55
Single Family Retrofit	\$ 6,174,820	\$ 470,733	\$ 705,936	Avoided GHGs	\$ 2,746,293	\$ 3,481,777	\$ 4,387,154	\$ 3,766,105	\$ 7,351,490	\$ 6,512,398	\$ 839,093	1.13
Elementary Energy Education	\$ 3,876,116	\$ 3,760,923	\$ 739,670	Avoided GHGs	\$ 329,330	\$ 1,787,683	\$ 1,787,423	\$ 1,412,064	\$ 8,376,709	\$ 1,741,394	\$ 6,635,315	4.81
Behavioral Energy Savings	\$ 3,180,524	\$ -	\$ 628,345	Avoided GHGs	\$ 468,217	\$ 2,783,495	\$ 2,958,654	\$ 2,810,721	\$ 3,808,873	\$ 3,278,938	\$ 529,935	1.16
Residential New Construction	\$ 3,644,191	\$ -	\$ 664,049	Avoided GHGs	\$ 904,038	\$ 1,240,200	\$ 2,469,315	\$ 1,975,452	\$ 4,308,240	\$ 2,879,490	\$ 1,428,750	1.50
Economic Redevelopment	\$ 1,095,673	\$ -	\$ 204,431	Avoided GHGs	\$ 344,202	\$ 679,576	\$ 889,600	\$ 622,820	\$ 1,300,103	\$ 967,023	\$ 333,081	1.34
Retro-Commissioning	\$ 5,550,183	\$ -	\$ 1,066,120	Avoided GHGs	\$ 1,172,107	\$ 1,040,788	\$ 1,205,218	\$ 1,227,846	\$ 6,616,304	\$ 2,399,953	\$ 4,216,351	2.76
Custom Business	\$ 74,920,919	\$ -	\$ 13,808,045	Avoided GHGs	\$ 5,740,561	\$ 11,474,852	\$ 36,335,857	\$ 25,751,493	\$ 88,728,962	\$ 31,492,054	\$ 57,236,908	2.82
Business New Construction	\$ 3,073,182	\$ -	\$ 561,898	Avoided GHGs	\$ 313,105	\$ 607,593	\$ 1,814,018	\$ 936,477	\$ 3,635,080	\$ 1,249,583	\$ 2,385,497	2.91
Small Business Direct Install	\$ 23,944,815	\$ 1,286,610	\$ 3,538,622	Avoided GHGs	\$ 2,111,929	\$ 4,206,116	\$ 2,739,163	\$ 2,739,163	\$ 28,770,048	\$ 4,851,093	\$ 23,918,955	5.93
Business Incentive	\$ 56,804,044	\$ 497,368	\$ 10,074,591	Avoided GHGs	\$ 4,980,703	\$ 3,436,445	\$ 9,788,373	\$ 7,874,250	\$ 67,376,003	\$ 12,854,953	\$ 54,521,050	5.24
Sum of programs	\$ 303,788,777	\$ 32,223,859	\$ 43,777,767		\$ 32,686,191	\$ 61,825,393	\$ 152,196,994	\$ 116,674,672	\$ 379,790,403	\$ 149,360,862	\$ 230,429,541	2.54
Portfolio Costs					\$ 30,340,200					\$ 30,340,200	\$ (30,340,200)	
<b>Aggregate Portfolio</b>	\$ 303,788,777	\$ 32,223,859	\$ 43,777,767		\$ 63,026,391	\$ 61,825,393	\$ 152,196,994	\$ 116,674,672	\$ 379,790,403	\$ 179,701,062	\$ 200,089,341	2.11

Note: Two additional programs, Building Performance with ENERGY STAR and Emerging Technology, also operated during GPY1 to GPY3. However, the therm savings for these programs are not included in the TRC calculations for the portfolio because they generated no or an insignificant amount of savings. The program costs incurred are included as part of the Portfolio cost component.

Source: Navigant analysis

**Table 4-2. Summary of Program Level Benefits, Costs (\$ in 000's) and Utility Cost Test–  
Nicor Specific w/o Electric Data from Joint Programs**

Program  (a)	Benefits				Costs				Utility Cost Test (UCT)			
	Avoided Energy Production	Avoided Water Use	Other Benefits	Definition of Other Benefits	Non-Incentive Costs	Incentive Costs	Incremental Costs (Gross)	Incremental Costs (Net)	UCT Benefits	UCT Costs	UCT Test Net Benefits	UCT Test
	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j) = (b)	(k) = (f+g)	(l) = (j-k)	(m) = (j/k)
Multi-Family Retrofit	\$ 43,029,312	\$ 8,787,330	\$ 5,722,642	Avoided GHGs	\$ 3,897,734	\$ 11,934,204	\$ 12,146,437	\$ 11,398,744	\$ 43,029,312	\$ 15,831,938	\$ 27,197,374	2.72
Heating & Appliance Incentive	\$ 78,494,998	\$ 17,420,895	\$ 6,063,414	Avoided GHGs	\$ 9,677,971	\$ 19,152,664	\$ 75,675,781	\$ 56,159,534	\$ 78,494,998	\$ 28,830,635	\$ 49,664,363	2.72
Single Family Retrofit	\$ 6,174,820	\$ 470,733	\$ 705,938	Avoided GHGs	\$ 2,746,293	\$ 3,481,777	\$ 4,387,154	\$ 3,766,105	\$ 6,174,820	\$ 6,228,070	\$ (53,251)	0.99
Elementary Energy Education	\$ 3,876,116	\$ 3,760,923	\$ 739,670	Avoided GHGs	\$ 329,330	\$ 1,787,683	\$ 1,787,423	\$ 1,412,064	\$ 3,876,116	\$ 2,117,013	\$ 1,759,103	1.83
Behavioral Energy Savings	\$ 3,180,524	\$ -	\$ 628,349	Avoided GHGs	\$ 468,217	\$ 2,783,495	\$ 2,958,654	\$ 2,810,721	\$ 3,180,524	\$ 3,251,712	\$ (71,188)	0.98
Residential New Construction	\$ 3,644,191	\$ -	\$ 664,049	Avoided GHGs	\$ 904,038	\$ 1,240,200	\$ 2,469,315	\$ 1,975,452	\$ 3,644,191	\$ 2,144,238	\$ 1,499,953	1.70
Economic Redevelopment	\$ 1,095,673	\$ -	\$ 204,431	Avoided GHGs	\$ 344,202	\$ 679,576	\$ 889,600	\$ 622,820	\$ 1,095,673	\$ 1,023,778	\$ 71,895	1.07
Retro-Commissioning	\$ 5,550,183	\$ -	\$ 1,066,120	Avoided GHGs	\$ 1,172,107	\$ 1,040,788	\$ 1,205,218	\$ 1,227,846	\$ 5,550,183	\$ 2,212,895	\$ 3,337,288	2.51
Custom Business	\$ 74,920,919	\$ -	\$ 13,808,043	Avoided GHGs	\$ 5,740,561	\$ 11,474,852	\$ 36,335,857	\$ 25,751,493	\$ 74,920,919	\$ 17,215,413	\$ 57,705,506	4.35
Business New Construction	\$ 3,073,182	\$ -	\$ 561,898	Avoided GHGs	\$ 313,105	\$ 607,593	\$ 1,814,018	\$ 936,477	\$ 3,073,182	\$ 920,698	\$ 2,152,483	3.34
Small Business Direct Install	\$ 23,944,815	\$ 1,286,610	\$ 3,538,622	Avoided GHGs	\$ 2,111,929	\$ 4,206,116	\$ 2,739,163	\$ 2,739,163	\$ 23,944,815	\$ 6,318,045	\$ 17,626,770	3.79
Business Incentive	\$ 56,804,044	\$ 497,368	\$ 10,074,591	Avoided GHGs	\$ 4,980,703	\$ 3,436,445	\$ 9,788,373	\$ 7,874,250	\$ 56,804,044	\$ 8,417,149	\$ 48,386,895	6.75
Sum of programs	\$ 303,788,777	\$ 32,223,859	\$ 43,777,767		\$ 32,686,191	\$ 61,825,393	\$ 152,196,994	\$ 116,674,672	\$ 303,788,777	\$ 94,511,584	\$ 209,277,192	3.21
Portfolio Costs					\$ 30,340,200					\$ 30,340,200	\$ (30,340,200)	
<b>Aggregate Portfolio</b>	\$ 303,788,777	\$ 32,223,859	\$ 43,777,767		\$ 63,026,391	\$ 61,825,393	\$ 152,196,994	\$ 116,674,672	\$ 303,788,777	\$ 124,851,784	\$ 178,936,993	2.43

Note: Two additional programs, Building Performance with ENERGY STAR and Emerging Technology, also operated during GPY1 to GPY3. However, the therm savings for these programs are not included in the TRC calculations for the portfolio because they generated no or an insignificant amount of savings. The program costs incurred are included as part of the Portfolio cost component.

Source: Navigant analysis

#### **4.1 Program Specific Data Review**

With respect to the program specific data used in TRC calculation, several were based on Nicor Gas' internal tracking and accounting systems. These include implementation, utility administration and utility incentive costs. Implementation and incentives costs are tracked by program, where utility administration costs were provided by Nicor Gas' energy efficiency staff. It is worth noting that many of the programs were jointly implemented by Nicor Gas and Commonwealth Edison (ComEd). These programs include Single Family Retrofit, Elementary Energy Education, Residential New Construction, Multi-Family Retrofit, Small Business Direct Install, Business New Construction, and Retro-Commissioning. In these cases, the utility costs were split between the utilities based on an agreed percentage.

The remaining data points that were provided by Nicor Gas in the TRC evaluation were the Measure Life and Incremental Costs. The Measure Life determines how long the energy and demand savings from any one measure will last. The Incremental costs are the costs associated with participating in the program, before accounting for any incentives. In most cases, these costs are the difference between the more energy efficient measure purchased due to participation in the energy efficiency program and the baseline measure costs, which is what the participant would presumably have bought in absence of the program. In some instances, the "baseline" measure is to not install any measure, such as for attic insulation. In these instances, the incremental cost is the full cost of the measure. In rebate programs, participants generally pay a portion of the incremental costs, in contrast with direct install programs where the utility generally pays most or all of the incremental costs. In all these cases, the participant incremental costs should be included in the TRC calculation if non-zero.

#### **4.2 Heating & Appliance Incentive**

Under the Rider 30, Heating & Appliance Incentive Program, cash incentives and education were offered to encourage upgrading of water- and space-heating equipment among residential customers of Nicor Gas. The Heating & Appliance Incentive Program was designed to conserve natural gas and electricity and to lower participants' monthly energy bills. Both rental and owner-occupied dwellings are eligible for rebates for furnaces, boilers, storage water heaters, central air conditioning systems, and programmable thermostats. The premises must be used for residential purposes in existing buildings. The Heating & Appliance Incentive Program was implemented by Resource Solutions Group, which has since been acquired and become part of CLEAResult.

**Table 4-3. IL TRC Components for Heating & Appliance Incentive Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	11,821,343
Ex-Post Net Savings (Therms) @ the Meter	9,014,820
Utility Non-Incentive Costs	\$9,677,971
Utility Incentive Costs	\$19,152,664
Gross Incremental Costs	\$75,675,781
Net Incremental Costs	\$56,159,534
Total TRC Benefits	\$101,979,306
Total TRC Costs – summary	\$65,837,505
Total TRC Net Benefits	\$36,141,801
TRC Test Ratio	1.55

Source: Navigant analysis

### 1.1.1 Measure Life

The range of measure lives were used for the Heating & Appliance Incentive program depending on which measure group was being analyzed. The table below summarizes the measure lives used for different measures of the program. These measure lives are consistent with the current version of the Illinois TRM 3.0.

**Table 4-4. Measure life of the Heating & Appliance Incentive Program Measures**

Measure	Measure Life (in years)
Programmable Thermostats	5
Bathroom Aerators	9
Kitchen Aerators	9
Showerhead	10
Indirect Water Heater	12
Storage Water Heater	13
Pipe Insulation	15
Furnace	20
Boilers	25
Window	30

Source: Navigant analysis

### 1.1.2 Participant/Incremental Costs

Incremental measures costs are deemed per measure in the Illinois TRM and were used to determine the program participant costs. Navigant began by using incremental costs that were consistent with the filed plan for GPY1 to GPY3. Many of these values were then updated to be consistent with recent iterations of the Illinois TRM. The incremental costs for some measures, such as water saving measures, were based on actual cost based on program records, as allowed by the TRM. The table below summarizes the incremental cost used for the Heating & Appliance Incentive program measures.

**Table 4-5. Incremental Cost of the of the Heating & Appliance Incentive Program Measures**

Measure	Incremental cost per unit (in \$)
Programmable Thermostats	30
Bathroom Aerators	23.90
Kitchen Aerators	29
Showerhead	30
Indirect Water Heater	1,136
Storage Water Heater	400
Pipe Insulation	9 - 18
Furnace	802 - 1,650
Boilers	1,272 - 1,994
Window	1,413

Source: Navigant analysis

### 1.1.3 Incentive Costs

The primary component included in the incentive costs for the Heating & Appliance Incentive program are the rebates given to participants for purchased measures. This component comprises approximately 90 percent of the total incentive costs. The remaining 10 percent consists of the cost of direct install labor and materials during GPY3.

### 1.1.4 Load Shape

The Heating & Appliance Incentive program used both year around and winter only load shapes due to the inclusion of both heating and water measures in the program, which generate savings over different parts of the calendar year.

### 1.1.5 Impact Results

Table 4-6 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-6. Heating & Appliance Incentive GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	1,591,644	2,847,533	6,763,931	11,203,108
Verified Gross Realization Rate	1.00	1.00	1.09	1.06
Verified Gross	1,592,503	2,858,644	7,370,196	11,821,343
Verified Net	1,098,827	1,972,464	5,943,529	9,014,820
NTG Ratio	0.69	0.69	0.81	0.76

Source: Navigant analysis

## 4.3 Single Family Retrofit

The Single Family Retrofit program is a joint program of Nicor Gas and ComEd, with Nicor Gas leading the program implementation. The Single Family Retrofit program sought to achieve therm savings

through the implementation of home energy assessments to promote discounted weatherization services and the direct installation of energy efficiency measures in residential Nicor Gas territory single-family home residences or two to four unit buildings. Program activities were implemented through CSG staff and contracted weatherization providers. During the assessment, CFLs, showerheads, aerators, hot water temperature setback, programmable thermostat setting, and pipe insulation were directly installed at no additional charge for instant energy savings. A programmable thermostat was also offered at a reduced price for interested participants. Assessment staff generated a recommendation report for customers based on the customer’s home characteristic information. The customer report outlined recommended measures (e.g. attic insulation, air sealing), potential savings, payback periods, and the amount of incentives available for recommended work. Customers chose the projects they wanted to pursue. A program-eligible contractor was then assigned to perform the work and discounts were offered instantaneously.

**Table 4-7. IL TRC Components for Single Family Retrofit**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	778,556
Ex-Post Net Savings (Therms) @ the Meter	669,558
Utility Non-Incentive Costs	\$2,746,293
Utility Incentive Costs	\$3,481,777
Gross Incremental Costs	\$4,387,154
Net Incremental Costs	\$3,766,105
Total TRC Benefits	\$7,351,490
Total TRC Costs – summary	\$6,512,398
Total TRC Net Benefits	\$839,093
TRC Test Ratio	1.13

Source: Navigant analysis

### 1.1.6 Measure Life

The range of measure lives were used for the Single Family Retrofit program depending on the measure group. The table below summarizes the measure lives used for different measures of the program.

**Table 4-8. Measure life of the Single Family Retrofit Program Measures**

Measure	Measure Life (in years)
Thermostat Education	2
Water Heater Set Back	2
Programmable Thermostat	5
Bathroom Aerator	9
Kitchen Aerator	9
Showerhead	10
Pipe Insulation	15
Retrofits	25

Source: Navigant analysis

### 1.1.7 Participant/Incremental Costs

The table below summarizes the incremental cost used for the Single Family Retrofit program measures. For this program, most of the incremental costs are based on the actual program expenditures per installed measure in each program year. This also includes the labor costs associated with retrofits and energy assessments through the program. Some of the measures, such as programmable thermostats, utilize TRM values for their incremental costs.

**Table 4-9. Incremental Cost of the of the Single Family Retrofit Program Measures**

Measure	Incremental cost per unit (in \$)
Thermostat Education	25
Water Heater Set Back	5
Programmable Thermostat	30
Bathroom Aerator	2
Kitchen Aerator	5
Showerhead	9 - 13
Pipe Insulation	6 - 9
Retrofits	1,240 – 1,514

Source: Navigant analysis

### 1.1.8 Incentive Costs

The primary component included in the incentive costs for the Single Family Retrofit program are the rebates given to participants for purchased measures in the form of instantaneous discounts. This component comprises approximately 78 percent of the total incentive costs. The remaining amount includes the cost of direct install labor and materials during GPY3.

### 1.1.9 Load Shape

The Single Family Retrofit program included both heating and water measures. Therefore, both year around and winter only load shapes were used for the cost-effectiveness analysis.

### 1.1.10 Impact Results

Table 4-10 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-10. Single Family Retrofit GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	104,505	274,505	396,430	775,440
Verified Gross Realization Rate	1.05	1.00	1.00	1.00
Verified Gross	109,380	273,900	395,276	778,556
Verified Net	94,067	235,554	339,937	669,558
NTG Ratio	0.86	0.86	0.86	0.86

Source: Navigant analysis

#### 4.4 Multi-Family Comprehensive Energy Efficiency Program

The Multi-Family Comprehensive Energy Efficiency program achieves natural gas energy savings for customers of Nicor Gas and electric energy and demand savings for ComEd customers. Franklin Energy Services, LLC was the primary implementation contractor for the program.

During the three program years, the Multi-Family Comprehensive Energy Efficiency program continued to implement its direct install components (programmable thermostats, hot water pipe wrap insulation, and water efficiency measures in residential dwelling units and common areas). Concurrently, the program offered technical services and financial incentives to commercial contractors and multi-family decision-makers to install program measures designed to achieve energy savings in whole buildings and grounds. These measures include upgrades or improvements to central plant and heating, ventilating, and air-conditioning (HVAC) systems and controls, interior and exterior lighting systems, building shell improvements, among others. The Multi-Family Comprehensive Energy Efficiency program was delivered through three channels: direct install, trade ally installation, and prescriptive incentives.

**Table 4-11. IL TRC Components for Multi-Family Comprehensive Energy Efficiency Program GPY1-GPY3**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	6,663,775
Ex-Post Net Savings (Therms) @ the Meter	6,296,467
Utility Non-Incentive Costs	\$3,897,734
Utility Incentive Costs	\$11,934,204
Gross Incremental Costs	\$12,146,437
Net Incremental Costs	\$11,398,744
Total TRC Benefits	\$57,539,284
Total TRC Costs – summary	\$15,296,479
Total TRC Net Benefits	\$42,242,806
TRC Test Ratio	3.76

Source: Navigant analysis

##### 1.1.11 Measure Life

The range of measure lives were used for the Multi-Family Comprehensive Energy Efficiency program depending on the measure group. The table below summarizes the measure lives used for different measures of the program. These measure lives are consistent with the current version of the Illinois TRM.

**Table 4-12. Measure life of the Multi-Family Comprehensive Energy Efficiency Program Measures**

Measure	Measure Life (in years)
Water Heater Set back	2
Boiler Tune-up	3
Furnace Tune-up	3
Programmable Thermostats	5
Pre-rinse spray valves	5
Steam-trap	6
Bathroom Aerators	9
Kitchen Aerators	9
Showerhead	10
Condensing Unit Heater	12
Storage Water Heater	13
Air Sealing	15
Pipe Insulation	15
Furnace	20
Hydronic Boiler	20
Steam Boiler	20
Boiler Reset Controls	20
Attic Insulation	25

*Source: Navigant analysis*

#### **1.1.12 Participant/Incremental Costs**

The table below summarizes the incremental cost used for the Multi-Family Comprehensive Energy Efficiency program measures. For this program, most of the incremental costs are based on the actual program expenditures per installed measure in each program year. This also includes the labor costs associated with retrofits and energy assessments through the program. Some of the measures, such as programmable thermostats, utilize TRM values for their incremental costs. Other measures, such as pipe insulation, show a wide range of incremental costs due to a different unit of measure utilized in the tracking data over the three years of program implementation.

**Table 4-13. Incremental Cost of the of the Multi-Family Comprehensive Energy Efficiency Measures**

Measure	Incremental cost per unit (in \$)
Boiler Tune-up	334
Furnace Tune-up	743
Programmable Thermostats	30
Pre-rinse spray valves	54
Steam-trap	65
Bathroom Aerators	1 - 5
Kitchen Aerators	2 - 5
Showerhead	2 - 10
Condensing Unit Heater	676
Storage Water Heater	1,077
Air Sealing	3,385
Pipe Insulation	3 - 518
Furnace	1,438
Hydronic Boiler	1,470
Steam Boiler	4,786
Boiler Reset Controls	612
Attic Insulation	975 - 16,690

*Source: Navigant analysis*

### 1.1.13 Incentive Costs

Incentive costs for the Multi-Family Comprehensive Energy Efficiency program include a combination of financial incentives for prescriptive measures as well as the cost of labor and materials for direct installation measures. About seven percent of the total incentive cost also includes mid-stream payments.

### 1.1.14 Load Shape

This program used both year around and winter only load shapes to model program savings and avoided costs. The program included both heating and water measures.

### 1.1.15 Impact Results

Table 4-14 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-14. Multi-Family Comprehensive Energy Efficiency Program GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	986,438	628,088	5,013,722	6,628,248
Verified Gross Realization Rate	1.01	1.00	1.00	1.01
Verified Gross	997,875	628,071	5,037,829	6,663,775
Verified Net	957,960	602,948	4,735,559	6,296,467
NTG Ratio	0.96	0.96	0.94	0.94

Source: Navigant analysis

#### 4.5 Residential New Construction

The Residential New Construction program is jointly offered by Nicor Gas and ComEd. Nicor Gas is the lead utility as the majority of the avoided costs are from natural gas savings. Residential Science Resources (“RSR”) implements the program for both utilities. The program launched in early 2012 and did not claim savings in the first program year, but ex ante gross savings estimates exceeded both gas and electric savings targets for GPY2/EPY5 and again in GPY3/EPY6. RSR uses completed REM/Rate files for each home to calculate whole-house savings. In addition, ComEd incentivizes several ENERGY STAR electric appliances and claims savings from these installations as well as whole-home electricity savings.

The Residential New Construction Program pays incentives to raters and to builders; builders receive additional incentives from ComEd for installing program-qualified ENERGY STAR electric appliances. To qualify for the program, homes must achieve savings of at least 10 percent over an equivalent code-compliant new home based on REM/Rate modeling. The residential energy code in effect in Illinois was IECC 2009 through December 2012. The residential energy code IECC 2012 was in effect beginning in January 2013.

**Table 4-15. IL TRC Components for Residential New Construction**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	452,857
Ex-Post Net Savings (Therms) @ the Meter	362,286
Utility Non-Incentive Costs	\$904,038
Utility Incentive Costs	\$1,240,200
Gross Incremental Costs	\$2,469,315
Net Incremental Costs	\$1,975,452
Total TRC Benefits	\$4,308,240
Total TRC Costs – summary	\$2,879,490
Total TRC Net Benefits	\$1,428,750
TRC Test Ratio	1.50

Source: Navigant analysis

##### 1.1.16 Measure Life

The measure life used in the TRC calculation of Residential New Construction program is 25 years.

### 1.1.17 Participant/Incremental Costs

The per unit incremental costs utilized in the TRC analysis is in the range of \$1,422 – \$2,435 per incentivized projects. These costs are based on actual program costs of incentivized measures.

### 1.1.18 Incentive Costs

All of the incentive costs reported for the Residential New Construction program are due to financial incentives provided to participants for purchasing and installing gas saving measures which constructing residential homes.

### 1.1.19 Load Shape

Annual load shape curve was used to model residential new construction program savings and avoided costs.

### 1.1.20 Impact Results

Table 4-16 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-16. Residential New Construction GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	N/A	242,112	256,445	498,557
Verified Gross Realization Rate	N/A	0.91	0.91	0.91
Verified Gross	N/A	220,300	232,557	452,857
Verified Net	N/A	176,240	186,046	362,286
NTG Ratio	N/A	0.80	0.80	0.80

Source: Navigant analysis

## 4.6 Elementary Energy Education

The Elementary Energy Education (EEE) program is implemented by National Energy Foundation (NEF) and is branded “THINK! ENERGY.” The program targeted students in public and private schools that are customers of Nicor Gas or jointly Nicor Gas and ComEd. Schools received an invitation to participate and register to schedule the interactive presentations; alternatively, schools could register on the program website to join a waiting list if the program was fully-enrolled when they registered. After the presentation, students took home a kit that included several components: water conservation measures; instruments to measure water temperature, ambient temperature, and water flow rates; and a home energy worksheet (“HEW”) where participants reported details of their family’s participation in Scantron form. Students and teachers were incentivized to return the home energy worksheets with a \$100 mini-grant for each class that completes and returns 80 percent of their HEWs. Students were also incentivized to receive a program wristband if they complete and return a HEW. In addition, teachers who returned 80 percent of the HEWs were entered into a raffle to win an iPad. NEF based the program’s savings on the installation rate of implemented measures reported in the HEW against the number of kits that were reported taken home.

**Table 4-17. IL TRC Components for Elementary Energy Education**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	869,460
Ex-Post Net Savings (Therms) @ the Meter	686,873
Utility Non-Incentive Costs	\$329,330
Utility Incentive Costs	\$1,787,683
Gross Incremental Costs	\$1,787,423
Net Incremental Costs	\$1,412,064
Total TRC Benefits	\$8,376,709
Total TRC Costs – summary	\$1,741,394
Total TRC Net Benefits	\$6,635,315
TRC Test Ratio	4.81

*Source: Navigant analysis*

#### **1.1.21 Measure Life**

Measure life of 9 years was used in the TRC calculation of the EEE program. This is a weighted average amount for the various measures that are included in the kits, including 9 years for bathroom and kitchen aerators and 10 years for showerheads.

#### **1.1.22 Participant/Incremental Costs**

The incremental cost in the range of \$29-\$38 was used for cost-effectiveness analysis of the elementary energy education program, based on the actual program costs of procuring the energy saving kits. The costs represent the full cost of purchasing these kits as opposed to their incremental cost over baseline measures.

#### **1.1.23 Incentive Costs**

The incentive costs for the Elementary Energy Education program include the cost of the gas saving measures included within the energy saving kits given to students free of charge.

#### **1.1.24 Load Shape**

Elementary Energy Education program uses year around load shape.

#### **1.1.25 Impact Results**

Table 4-18 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-18. Elementary Energy Education GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	34,298	217,254	432,746	684,298
Verified Gross Realization Rate	3.18	1.51	1.00	1.27
Verified Gross	109,222	327,689	432,549	869,460
Verified Net	86,285	258,874	341,714	686,873
NTG Ratio	0.79	0.79	0.79	0.79

Source: Navigant analysis

### 4.7 Behavioral Energy Savings Program

The Behavioral Energy Savings Program (BESP) is designed to generate gas savings by providing residential customers with information about their specific gas use and related conservation suggestions and tips. The information is provided in the form of reports that give customers various types of information, including: a) how their recent gas use compares to their use in the past; b) tips on how to reduce consumption, some of which are tailored to the customer’s circumstances; and c) information on how their gas use compares to that of neighbors with similar homes. This set of information has been shown in other studies to stimulate customers to reduce their gas use, creating average savings around 1%, depending on local gas use patterns.

An important feature of the program is that it is a randomized controlled trial. Customers in the program are randomly assigned to a treatment (participant) group and a control (non-participant) group, for the purpose of estimating changes in gas use due to the program. The GPY3 program ran from October 2013 through October 2014 with reports sent throughout the heating season (October 2013 through April 2014).

The HER program included a pilot program, ENERGYBUZZ, which gave participants access to a variety of tools and ongoing communications via an online platform at NicorGasEnergyBuzz.com. Overall, the ENERGYBUZZ web portal intended to encourage Nicor Gas customers to save energy through behavior change and participation in other Nicor Gas energy efficiency programs. The program was soft launched in August 2012 (during GPY2). The pilot phase was set to last for three years, but due to low participation and complexities in linking gas accounts to the online portal this program was discontinued on November 30<sup>th</sup>, 2013.

**Table 4-19. IL TRC Components for BESP Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	4,131,822
Ex-Post Net Savings (Therms) @ the Meter	4,131,822
Utility Non-Incentive Costs	\$468,217
Utility Incentive Costs	\$2,783,495
Gross Incremental Costs	\$2,958,654
Net Incremental Costs	\$2,810,721
Total TRC Benefits	\$3,808,873
Total TRC Costs – summary	\$3,278,938
Total TRC Net Benefits	\$529,935
TRC Test Ratio	1.16

Source: Navigant analysis

### 1.1.26 Measure Life

A measure life of one year was assumed for the Behavioral Energy Savings program. This assumes that there would be no persistence in participant savings were the delivery of the home energy reports discontinued. A recently finished persistence study determined that the presence of household savings beyond the time during which reports are delivered results in an effective measure life of approximately three years, making the measure life of one year conservative. In future TRC evaluations, this assumption will be updated to incorporate the results of the persistence study.

### 1.1.27 Participant/Incremental Costs

The incremental cost in the range of \$6-\$600 per unit was used for the Behavioral Energy Savings Program. For the Behavioral Energy Savings program, the incremental costs include the costs of program set-up and establishing the participating customers, as well as report production and delivery. These costs per report were significant in the early stages of the program due to advertising and program ramp-up, but diminished greatly on a per unit basis once the program became established and due to the ENERGYBUZZ pilot program.

### 1.1.28 Incentive Costs

The incentive costs for the Behavioral Energy Savings program includes the cost of producing and delivery the program reports to participating households. No cash incentives are provided to participants through the program.

### 1.1.29 Load Shape

The TRC calculation of Behavioral Energy Savings program used year around load shape curve. This is appropriate given the target customer base for the program.

### 1.1.30 Impact Results

Table 4-20 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-20. BESP GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Net	N/A	11,955	4,156,761	4,168,716
Verified Net Realization Rate	N/A	1.739	0.99	0.99
Verified Net	N/A	20,722	4,111,100	4,131,822

Source: Navigant analysis

## 4.8 Business Incentive

The Business Incentive program provides incentives to increase the market share of new, highly efficient space heating, water heating, and commercial kitchen equipment as well as rebates for equipment and services to improve the energy efficiency of existing equipment. Participants must purchase and install equipment covered by the program. Trade ally support and engagement is considered to be a key element to the success of this program. The Business Incentive program is implemented by CLEAResult. The BEER Program works closely with the Nicor Gas Business Custom Program and the other business programs within the portfolio to target both end-use customers and trade allies.

**Table 4-21. IL TRC Components for Business Incentive Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	16,154,254
Ex-Post Net Savings (Therms) @ the Meter	12,904,121
Utility Non-Incentive Costs	\$4,980,703
Utility Incentive Costs	\$3,436,445
Gross Incremental Costs	\$9,788,373
Net Incremental Costs	\$7,874,250
Total TRC Benefits	\$67,376,003
Total TRC Costs – summary	\$12,854,953
Total TRC Net Benefits	\$54,521,050
TRC Test Ratio	5.24

Source: Navigant analysis

### 1.1.31 Measure Life

Business Incentive program included different measure groups and therefore range of measure lives were used for the cost-effectiveness analysis. The table below summarizes the measure lives used for different measures of the program.

**Table 4-22. Measure life of the Business Incentive Program Measures**

Measure	Measure Life (in years)
Boiler Tune-up	3
Pre-Rinse Spray Valve	5
Steam Trap	6
Outdoor Pool Cover	6
Programmable Thermostat	8
Infrared Upright Broiler	10
DCV	10
Ozone Laundry	10
Infrared Heaters	12
Convection Oven	12
Combination Oven	12
Commercial Steamer	12
Griddle	12
Infrared Charbroiler	12
Infrared Heater	12
Infrared Rotisserie Oven	12
Infrared Salamander Broiler	12
Pasta Cooker	12
Rack Oven	12
Pipe Insulation	15
Storage Water Heater	15
Fryer	15
Furnace >92% AFUE	16.5
Large Conveyor Oven	17
Hydronic Boilers	20
Condensing Boiler	20
Combined High Efficiency Boiler & Water Htg. Unit	20
Boiler Reset Control	20

*Source: Navigant analysis*

### 1.1.32 Participant/Incremental Costs

The table below summarizes the incremental cost used for the Business Incentive program measures. For this program, the incremental costs are based on a combination of the actual program expenditures for incentivized measure in each program year (based on unit quantity) and TRM values for incentivized measures. Some measures show a wide range of incremental costs due to different program costs through the three program years for installed measures of different sizes, a range of capacity or efficiency levels for incentivized measures, or a different unit of measure utilized in the tracking data over the three years of program implementation.

**Table 4-23. Incremental Cost of the of the Business Incentive Program Measures**

Measure	Incremental cost (in \$)
Boiler Tune-up	332 - 664
Pre-Rinse Spray Valve	100
Steam Trap	77 - 370
Outdoor Pool Cover	2,040 – 5,157
Programmable Thermostat	75 - 181
Infrared Upright Broiler	1,089
DCV	2,539
Ozone Laundry	8,614
Infrared Heaters	451
Convection Oven	306
Combination Oven	4,300
Commercial Steamer	4,300
Griddle	60
Infrared Charbroiler	2,200
Infrared Heater	1,716
Infrared Rotisserie Oven	2,700
Infrared Salamander Broiler	1,000
Pasta Cooker	1,000
Rack Oven	8,646
Pipe Insulation	14 – 7,000
Storage Water Heater	209
Fryer	1,200
Furnace >92% AFUE	802 – 1,511
Large Conveyor Oven	1,800
Hydronic Boilers	1,470 – 2,570
Condensing Boiler	3,370 – 9,415
Combined High Efficiency Boiler & Water Htg. Unit	2,400
Boiler Reset Control	612

*Source: Navigant analysis*

### 1.1.33 Incentive Costs

All of the incentive costs reported for the Business Incentive program are due to financial incentives provided to participants for purchasing and installing prescriptive gas saving measures.

### 1.1.34 Load Shape

This program includes both year around and winter only load shapes because it contained both heating and water measures.

### 1.1.35 Impact Results

Table 4-24 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-24. Business Incentive Program GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	1,742,478	3,296,519	11,185,216	16,224,213
Verified Gross Realization Rate	1.00	1.00	0.99	1.00
Verified Gross	1,742,478	3,296,623	11,115,153	16,154,254
Verified Net	1,272,009	2,406,535	9,225,577	12,904,121
NTG Ratio	0.73	0.73	0.83	0.80

Source: Navigant analysis

## 4.9 Business Custom

The Business Custom provides business customers with financial incentives for the installation of natural gas-related energy improvements that are not specified for a prescriptive rebate under the Nicor Gas Business Incentive program or other Nicor Gas programs. Participants span a range of market segments and can receive incentives for a wide variety of natural gas saving technologies. Typical market segments for this program may include light and heavy industry, steel and metal working, plastics compounding and processing, hospitals, food processing, hotels, commercial laundry and other process heating intensive businesses. Large centrally-heated multifamily buildings and office buildings are also target segments for this program. The Custom Program was implemented by CLEAResult for the Nicor Gas Rider 30 Energy Efficient Portfolio period.

**Table 4-25. IL TRC Components for Business Custom Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	11,597,812
Ex-Post Net Savings (Therms) @ the Meter	8,121,708
Utility Non-Incentive Costs	\$5,740,561
Utility Incentive Costs	\$11,474,852
Gross Incremental Costs	\$36,335,857
Net Incremental Costs	\$25,751,493
Total TRC Benefits	\$88,728,962
Total TRC Costs – summary	\$31,492,054
Total TRC Net Benefits	\$57,236,908
TRC Test Ratio	2.82

Source: Navigant analysis

### 1.1.36 Measure Life

There were a number of measures included in the Business Custom program with a wide range of appropriate measure lives. The measure lives ranges from 1 to 23 years.

### 1.1.37 Participant/Incremental Costs

Incremental cost data was provided by participants as part of their application for this program. Depending on the measure, the incremental cost ranges from \$3,850 to \$312,000 due to the varying nature of each custom project based on program records.

### 1.1.38 Incentive Costs

All of the incentive costs reported for the Business Custom program are due to financial incentives provided to participants for purchasing and installing gas saving measures.

### 1.1.39 Load Shape

All of the measures in the program were water heating and water saving measures. Therefore, this program used a year round load shape curve.

### 1.1.40 Impact Results

Table 4-26 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-26. Business Custom GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	1,622,380	3,317,145	5,449,949	10,389,474
Verified Gross Realization Rate	0.93	1.29	1.07	1.12
Verified Gross	1,510,285	4,263,751	5,823,776	11,597,812
Verified Net	800,451	3,069,901	4,251,356	8,121,708
NTG Ratio	0.53	0.72	0.73	0.70

Source: Navigant analysis

## 4.10 Economic Redevelopment

The Economic Redevelopment Program (ERP) targeted existing commercial, industrial, and commercial-sized multifamily facilities and properties undergoing major renovation in established “redevelopment areas” and encouraged that they incorporate energy efficiency measures into the renovation process. The program provided technical assistance and enhanced incentives to render energy efficiency projects more affordable within these economically challenged communities. Seventhwave, formerly the Energy Center of Wisconsin, is the implementation contractor for this program. Elevate Energy (a non-profit organization founded by the Center for Neighborhood Technology), located in Chicago, conducted marketing and outreach for the program, including recruiting qualified potential participants. The target audiences for outreach included chambers of commerce, economic development departments, building owners, architecture firms and contractors.

The ERP experienced slow participation uptake rates in GPY1 but, after a successful marketing and outreach campaign, significantly increased program participation from one project in GPY1 to 15 projects in GPY2 and 13 projects in GPY3. However, the ERP was discontinued as a separate program after GPY3,

and only the remaining projects in the pipeline were completed; additional projects were directed to another other Nicor Gas program.

**Table 4-27. IL TRC Components for Economic Redevelopment Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	198,145
Ex-Post Net Savings (Therms) @ the Meter	138,791
Utility Non-Incentive Costs	\$344,202
Utility Incentive Costs	\$679,576
Gross Incremental Costs	\$889,600
Net Incremental Costs	\$622,820
Total TRC Benefits	\$1,300,103
Total TRC Costs – summary	\$967,023
Total TRC Net Benefits	\$333,081
TRC Test Ratio	1.34

Source: Navigant analysis

#### 1.1.41 Measure Life

Economic Redevelopment Program used a range of measures with measure life assumed to be 15 years.

#### 1.1.42 Participant/Incremental Costs

Incremental costs for this program is in the range of \$27,722 to \$35,000 in PY2 and PY3, depending on the scale of projects, amount of technical assistance provided, and the recommended measures. In PY1, an incremental cost of \$1,000 was utilized due to the smaller scope of the one project implemented that year.

#### 1.1.43 Incentive Costs

Approximately one-third (32 percent) of the incentive costs for the Economic Redevelopment program are actual cash payments to offset the cost of installed energy efficiency measures. The remaining 68 percent of incentive costs came in the form of technical assistance and labor to facilitate planning and implementation of the projects in redevelopment areas.

#### 1.1.44 Load Shape

The ERP program used an annual load shape for the TRC calculations.

#### 1.1.45 Impact Results

Table 4-28 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-28. Economic Redevelopment GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	893	132,207	118,910	252,010
Verified Gross Realization Rate	1.00	0.85	0.71	0.79
Verified Gross	893	112,363	84,889	198,145
Verified Net	714	78,654	59,422	138,791
NTG Ratio	0.80	0.70	0.70	0.70

Source: Navigant analysis

#### 4.11 Retro-Commissioning

The Retro-Commissioning Program has been offered each of the three gas program years. The program was offered as a joint utility program with the gas utilities where service areas overlap ComEd’s. The overlapping territories include Nicor Gas, Peoples Gas and North Shore Gas. The Retro-Commissioning Program offering is a natural fit for joint delivery due to the intensive investigation and analysis of HVAC systems. Individual measures frequently save both electricity and natural gas and analyzing one energy source, while neglecting the other, would be a lost energy savings opportunity.

The program helps commercial and industrial customers improve the performance and reduce energy consumption of their facilities through the systematic evaluation of existing building systems. Generally, the program pays for 100% of a detailed retro-commissioning study. This payment is contingent upon a participant’s commitment to spend a defined amount of their own money implementing recommendations in the study that have a payback of 18 months or less. Retro-commissioning recommendations typically include low-cost or no-cost HVAC measures like (1) scheduling equipment with occupancy, (2) optimizing temperature set points and controls to operate equipment efficiently and (3) repairing worn-out or failed components that manifest themselves as energy waste rather than affecting the ability of the whole system to maintain comfort. The measures can usually be implemented in the course of normal maintenance or through enhancements to sensors or control sequences with existing building automation systems.

**Table 4-29. IL TRC Components for Business Retro-Commissioning Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	1,517,238
Ex-Post Net Savings (Therms) @ the Meter	1,547,583
Utility Non-Incentive Costs	\$1,172,107
Utility Incentive Costs	\$1,040,788
Gross Incremental Costs	\$1,205,218
Net Incremental Costs	\$1,227,846
Total TRC Benefits	\$6,616,304
Total TRC Costs – summary	\$2,399,953
Total TRC Net Benefits	\$4,216,351
TRC Test Ratio	2.76

Source: Navigant analysis

#### 1.1.46 Measure Life

Guidelines published for a Retro-Commissioning program run by Pacific Gas and Electric Company in 2010 listed 3 years as the effective measure life (EUL) for the resetting of HVAC controls and 5 years for recoding HVAC controls,<sup>4</sup> both of which are key components of the Retro-Commissioning program. For the installation of controls, a measure life longer than 5 years is not uncommon. The 5 year measure life is also consistent with what was used by the gas utilities jointly implementing the Retro-Commissioning program in EPY4. Therefore, Navigant used 5 year measure life for this program.

#### 1.1.47 Participant/Incremental Costs

Incremental measure costs were determined during the EM&V process and ranges in the range of \$11,000 to \$42,000 per project completed through the Retro-Commissioning program. These costs are based on the actual costs of implementing the recommended measures as compared to the alternate baseline measure, or no measure, as appropriate.

#### 1.1.48 Incentive Costs

Incentive payments for the Business Retro-Commissioning program include cash incentives to facilitate the installation of low or no-cost energy savings measures by paying for the entire cost of a retro-commissioning study for the participating premise.

#### 1.1.49 Load Shape

The program used an annual load shape to model program savings and avoided costs. This is appropriate given that the Retro-commissioning program targets larger C&I customers.

#### 1.1.50 Impact Results

Table 4-30 shows the key results of the gross and net impact evaluation using deemed savings estimates.

<sup>4</sup> “RCx Project Submittal Guidelines.” Pacific Gas and Electric Company. November 2010.

**Table 4-30. Retro-Commissioning GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	180,345	397,353	1,059,684	1,637,382
Verified Gross Realization Rate	0.82	1.01	0.91	0.93
Verified Gross	147,838	403,126	966,274	1,517,238
Verified Net	150,795	411,189	985,599	1,547,583
NTG Ratio	1.02	1.02	1.02	1.02

Source: Navigant analysis

#### 4.12 Small Business Direct Install Program

The Small Business Direct Install program is designed to assist qualified Nicor Gas non-residential customers<sup>5</sup> to achieve gas energy savings by educating them about energy efficiency opportunities through on-site assessments conducted by trade allies and direct-installation of natural gas energy efficiency measures at no cost to the customer. Further savings are available to participating customers through incentives of 30 to 75 percent offered for select contractor-installed natural gas efficient measures.

**Table 4-31. IL TRC Components for Direct Install Program**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	5,032,582
Ex-Post Net Savings (Therms) @ the Meter	5,032,582
Utility Non-Incentive Costs	\$2,111,929
Utility Incentive Costs	\$4,206,116
Gross Incremental Costs	\$2,739,163
Net Incremental Costs	\$2,739,163
Total TRC Benefits	\$28,770,048
Total TRC Costs – summary	\$4,851,093
Total TRC Net Benefits	\$23,918,955
TRC Test Ratio	5.93

Source: Navigant analysis

##### 1.1.51 Measure Life

The Small Business Direct Install program used a wide range of measure life numbers in the TRC analysis based on the program measure. The table below summarizes the measure lives used for different measures of the program.

<sup>5</sup> To qualify for SBEEP, customers must be active Commercial and Industrial (C&I) customers of Nicor Gas who use up to 60,000 therms per year.

**Table 4-32. Measure life of the Direct Install Program Measures**

Measure	Measure Life (in years)
Boiler Tune-up	3
Furnace Tune-up	3
Pre-rinse spray valve	5
HW Heater Insulation Jacket	5
Steam-trap	6
Programmable Thermostat	8
Bathroom Aerators	9
Kitchen Aerators	9
Showerhead	10
Infrared Heater	12
Storage Water Heater, 88%TE	15
Pipe Insulation	15
Furnace	16.5
Boiler Reset Controls	20

*Source: Navigant analysis*

#### **1.1.52 Participant/Incremental Costs**

Due to the varied nature of the measures installed through the Direct Install Program, incremental measure costs were determined during the EM&V process. Nicor Gas’s portion of the participant costs for this jointly implemented program is based upon utility agreed allocation percentages. The incremental costs are based on the actual program expenditures per installed measure in each program year, including the costs of direct installation where appropriate.

The table below summarizes the incremental cost used for the program measures.

**Table 4-33. Incremental Cost of the of the Direct Install Program Measures**

Measure	Incremental cost per unit (in \$)
Boiler Tune-up	300 -400
Furnace Tune-up	100 - 280
Pre-rinse spray valve	60 - 70
HW Heater Insulation Jacket	50
Steam-trap	77
Programmable Thermostat	75 - 200
Bathroom Aerators	21
Kitchen Aerators	18-25
Showerhead	35
Infrared Heater	1,716
Storage Water Heater, 88%TE	209
Pipe Insulation	14
Furnace	470 - 800
Boiler Reset Controls	612

Source: Navigant analysis

### 1.1.53 Incentive Costs

The primary component included in the incentive costs for the Small Business Direct Install program are the incentives provided to reduce the cost to participants of installing energy saving gas measures. Direct incentives comprises approximately 86 percent of the total incentive costs for the program. The balance is due to the cost of directly installing measures on-site through the program.

### 1.1.54 Load Shape

This program includes both heating and water measures. Therefore, both year round and winter only load shapes were used for the cost-effectiveness analysis of this program

### 1.1.55 Impact Results

Table 4-34 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-34. Direct Install Program GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	109,353	1,719,681	2,855,341	4,684,375
Verified Gross Realization Rate	1.00	1.25	0.97	1.07
Verified Gross	109,353	2,143,013	2,780,216	5,032,582
Verified Net	109,353	2,143,013	2,780,216	5,032,582
NTG Ratio	1.00	1.00	1.00	1.00

Source: Navigant analysis

### 4.13 Business New Construction Service

The Business New Construction Service Program aims to capture immediate and long-term energy efficiency opportunities that are available during the design and construction of new buildings, additions, and renovations in the non-residential market. The program is jointly offered by ComEd and Nicor Gas. The ComEd program has been operating since June 1, 2009 (EPY2). Nicor Gas joined the program to offer natural gas rebates in June 2011 (GPY1).

Seventhwave, formerly the Energy Center of Wisconsin, implements the program for both ComEd and Nicor Gas. Seventhwave reaches out to design professionals and customers at the beginning of the design process to engage them in the program as early as possible. In EPY5/GPY2 (June 1, 2012 to May 31, 2013), the program transitioned from three tracks—the Systems, Comprehensive, and Small Buildings tracks—to a single performance-based Comprehensive track model. The single track offers incentives and technical assistance to non-residential buildings greater than 20,000 square feet and residential buildings greater than 100,000 square feet for whole-building electric and gas savings. The program provides incentives for a variety of measures, including lighting and HVAC equipment and controls and building envelope measures.

**Table 4-35. IL TRC Components for Business New Construction Service**

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	612,967
Ex-Post Net Savings (Therms) @ the Meter	306,507
Utility Non-Incentive Costs	\$313,105
Utility Incentive Costs	\$607,593
Gross Incremental Costs	\$1,814,018
Net Incremental Costs	\$936,477
Total TRC Benefits	\$3,635,080
Total TRC Costs – summary	\$1,249,583
Total TRC Net Benefits	\$2,385,497
TRC Test Ratio	2.91

Source: Navigant analysis

#### 1.1.56 Measure Life

Measure life of 25 years was used for the Business New Construction program.

#### 1.1.57 Participant/Incremental Costs

Incremental costs for the Business New Construction Service program were determined by multiplying the total square footage of new construction enrolled in the program by \$0.33 per square foot. The incremental cost over three year period varies from \$5,141 to \$27,103, depending on the scale of the incentivized projects as well as the average amount of technical assistance offered per program year.

#### 1.1.58 Incentive Costs

Incentive costs for the Business New Construction Service program include both the financial incentives and labor associated with the technical assistance offered to participants for installing gas saving

measures. The former accounts for approximately 64 percent of incentive costs over the three year period, while technical assistance accounts for the remaining 36 percent.

### 1.1.59 Load Shape

Annual load curve representing all business customers was used to model program savings and avoided costs for the Business New Construction program.

### 1.1.60 Impact Results

Table 4-36 shows the key results of the gross and net impact evaluation using deemed savings estimates.

**Table 4-36 Business New Construction Service GPY1-GPY3 Impact Results**

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Ex-Ante Gross	76,803	230,054	304,131	610,988
Verified Gross Realization Rate	0.84	1.31	0.81	1.00
Verified Gross	64,400	301,717	246,850	612,967
Verified Net	21,252	156,893	128,362	306,507
NTG Ratio	0.33	0.52	0.52	0.50

*Source: Navigant analysis*