



Plan Year 1 through 3 Total Resource Cost (TRC) Test Results and Impact Summary Evaluation Report

FINAL

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

**Presented to
North Shore Gas**

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E. Executive Summary

For North Shore Gas Efficiency Portfolio has exceeded its key compliance requirements.¹ For North Shore Gas program year's GPY1 through GPY3,² the net verified savings of 3,889,036 therms exceeded its compliance filing goal of 3,464,409 net therms by 12 percent. Based on the Illinois TRC calculation, the portfolio TRC of 1.45 has met the statutory cost effectiveness test.

E.1. *Portfolio Total Resource Cost (TRC) Test Results*

This report summarizes findings regarding the cost-effectiveness of the North Shore 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 North Shore 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 North Shore Gas energy efficiency portfolio includes three tests, including two variations on the Total Resource Cost (TRC) Test for GHG emissions:

- Utility Cost Test (UCT)
- TRC Test Results with no benefits from avoided environmental damages
- Illinois (IL) TRC Test, which includes benefits from avoided environmental damages

Importantly, the North Shore Gas portfolio is cost-effective under all three tests performed by Navigant, the results of which are presented in Section 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 North Shore Gas portfolio under different scenarios.

Table-E 1 summarizes the annual and three-year combined results for the North Shore Gas portfolio at the program, sector, and portfolio levels. The results presented in this table are based on the IL TRC, 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 1.45, which breaks down to 1.18 for the Residential sector and 3.46 for the Commercial and Industrial sector. Additionally, all but one program, Home Energy Reports, were cost effective over the three year period.

¹ Integrys EE Compliance Filing June 1, 2011-May 31, 2014 (Docket 10-0564).

² Gas Program Year 1 (GPY1) began on June 1, 2011 and ended May 31, 2012. Gas Program Year 2 (GPY2) began on June 1, 2012 and ended May 31, 2013. Gas Program Year 3 (GPY3) began on June 1, 2013 and ended May 31, 2014.

Table-E 1. Summary of North Shore Gas GPY1-GPY3 IL TRC Results by Program – North Shore Gas Specific w/o Electric Data from Joint Programs

North Shore Gas 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
Residential Prescriptive Rebate	\$ 957,724	\$ 1,008,879	0.95	\$ 2,414,482	\$ 2,331,980	1.04	\$ 5,233,259	\$ 4,241,151	1.23	\$ 8,605,465	\$ 7,582,009	1.13
Multifamily Direct Install	\$ 436,811	\$ 119,223	3.66	\$ 594,193	\$ 212,536	2.80	\$ 593,689	\$ 560,456	1.06	\$ 1,624,692	\$ 892,214	1.82
Single Family Direct Install	\$ -	\$ 5,302	0.00	\$ 114,770	\$ 91,058	1.26	\$ 291,925	\$ 260,328	1.12	\$ 406,695	\$ 356,688	1.14
Home Energy Reports							\$ 502,746	\$ 595,241	0.84	\$ 502,746	\$ 595,241	0.84
All Residential	\$ 1,394,535	\$ 1,133,403	1.23	\$ 3,123,445	\$ 2,635,573	1.19	\$ 6,621,619	\$ 5,657,176	1.17	\$ 11,139,598	\$ 9,426,152	1.18
C&I Prescriptive Rebate	\$ 254,154	\$ 110,806	2.29	\$ 741,164	\$ 863,475	0.86	\$ 639,412	\$ 330,240	1.94	\$ 1,634,730	\$ 1,304,521	1.25
C&I Custom	\$ 206,690	\$ 87,554	2.36	\$ 1,525,057	\$ 438,744	3.48	\$ 5,521,470	\$ 1,000,116	5.52	\$ 7,253,217	\$ 1,526,414	4.75
C&I Small Business Efficiency	\$ 222,544	\$ 53,176	4.19	\$ 1,055,246	\$ 188,494	5.60	\$ 1,926,660	\$ 364,635	5.28	\$ 3,204,451	\$ 606,306	5.29
C&I Retrocommissioning (RCx)	\$ 229,353	\$ 82,846	2.77	\$ -	\$ 18,517	0.00	\$ 81,508	\$ 50,439	1.62	\$ 310,861	\$ 151,802	2.05
All C&I	\$ 912,741	\$ 334,382	2.73	\$ 3,321,467	\$ 1,509,231	2.20	\$ 8,169,051	\$ 1,745,430	4.68	\$ 12,403,259	\$ 3,589,043	3.46
Portfolio Level Costs		\$ 109,776	0.00		\$ 1,156,072	0.00		\$ 1,995,293	0.00	\$ -	\$ 3,261,141	0.00
Total	\$ 2,307,276	\$ 1,577,561	1.46	\$ 6,444,912	\$ 5,300,876	1.22	\$ 14,790,669	\$ 9,397,899	1.57	\$ 23,542,857	\$ 16,276,336	1.45

Source: Navigant Analysis

Though annual results are included in Table-E 1, the remainder of the report focuses on the combined three-year results, per regulatory requirements. Summary results for all three tests are presented in Section 2.

E.2. Portfolio Impact Evaluation Summary Results

This section summarizes numerical results of Navigant’s impact evaluation of the energy efficiency programs offered by North Shore Gas in Gas Plan Years 1 through 3 (GPY1 through GPY3), which ran from June 1, 2011 to May 31, 2014.

The North Shore Gas portfolio included four programs targeted to residential customers and four programs targeted to business customers. Verified savings results are used to determine compliance with statutory goals and are provided in this section.

This report does not cover program process evaluation results or recommendations. All recommendations and process evaluation results are in each program’s full evaluation report. Full program evaluation reports can be found on the Illinois Energy Efficiency Stakeholder Advisory Group website³.

Verified energy savings are documented in Table E-2 through Table E-5. Detailed tables with verified program savings and costs are provided in Section 3.

Table-E 2. North Shore Gas Portfolio Year 1 Results – Verified Net Energy Savings

Program/Path	Verified			
	RR	Gross (Therms)	NTGR	Net (Therms)
Residential Prescriptive Rebate / Home Energy Rebate	1.00	156,705	0.67	104,992
Single Family Direct Install / Home Energy Jumpstart	NA	NA	NA	NA
Home Energy Reports	NA	NA	NA	NA
Multifamily	1.00	88,076	0.90	79,254
C&I Prescriptive Rebate	1.00	98,905	0.43	42,542
C&I Custom Rebate	1.02	39,670	0.68	26,975
Retro-Commissioning	1.20	67,908	1.02	68,927
Small Business Energy Savings	0.99	43,955	0.99	43,515
Portfolio Total		495,219		366,205

Source: Navigant research and analysis

³ <http://www.ilsag.info/evaluation-documents.html>

Table-E 3. North Shore Gas Portfolio Year 2 Results – Verified Net Energy Savings

Program/Path	Verified			
	RR	Gross (Therms)	NTGR	Net (Therms)
Residential Prescriptive Rebate / Home Energy Rebate	1.02	330,612	0.80	264,489
Single Family Direct Install / Home Energy Jumpstart	0.89	21,858	0.96	20,984
Home Energy Reports	NA	NA	NA	NA
Multifamily	0.98	154,640	0.90	139,176
C&I Prescriptive Rebate	1.00	207,059	0.63	130,447
C&I Custom Rebate	0.81	249,179	0.78	194,360
Retro-Commissioning	NA	0	1.02	0
Small Business Energy Savings	1.02	261,732	0.99	259,115
Portfolio Total		1,225,080		1,008,571

Source: Navigant research and analysis

Table-E 4. North Shore Gas Portfolio Year 3 Results – Verified Net Energy Savings

Program/Path	Verified			
	RR	Gross (Therms)	NTGR	Net (Therms)
Residential Prescriptive Rebate / Home Energy Rebate	1.00	720,068	0.80	576,055
Single Family Direct Install / Home Energy Jumpstart	0.98	49,772	0.96	47,781
Home Energy Reports	NA	652,718	1.00	652,718
Multifamily	1.00	100,335	0.90	90,301
C&I Prescriptive Rebate	1.00	140,671	0.63	88,623
C&I Custom Rebate	0.99	734,951	0.93	685,751
Retro-Commissioning	1.00	23,123	1.02	23,585
Small Business Energy Savings	1.02	352,976	0.99	349,446
Portfolio Total		2,774,614		2,514,260

Source: Navigant research and analysis

Table-E 5. North Shore Gas Portfolio Years 1 through 3 Results – Verified Net Energy Savings

Program/Path	Verified	
	Gross (Therms)	Net (Therms)
Residential Prescriptive Rebate / Home Energy Rebate	1,207,385	945,536
Single Family Direct Install / Home Energy Jumpstart	71,630	68,765
Home Energy Reports	652,718	652,718
Multifamily	343,051	308,731
C&I Prescriptive Rebate	446,635	261,612
C&I Custom Rebate	1,023,800	907,086
Retro-Commissioning	91,031	92,512
Small Business Energy Savings	658,663	652,076
Portfolio Total	4,494,913	3,889,036
Compliance Filing Goal		3,464,409
Percent of Compliance Filing Goal		112%

Source: Navigant research and analysis

1. Overview

As part of Navigant's evaluation of North Shore Gas' (NSG) energy efficiency programs for gas program years one through three, we performed cost-benefit calculations based upon a combination of assumptions made by NSG, 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 Power Agency Act SB1592 as follows:

'Total resource cost test' or 'TRC test' means a standard that is met if, for an investment in energy efficiency or demand-response measures, the benefit-cost ratio is greater than one. The benefit-cost ratio is the ratio of the net present value of the total benefits of the program to the net present value of the total costs as calculated over the lifetime of the measures. A total resource cost test compares the sum of avoided gas utility costs, representing the benefits that accrue to the system and the participant in the delivery of those efficiency measures, to the sum of all incremental costs of end-use measures that are implemented due to the program (including both utility and participant contributions), plus costs to administer, deliver, and evaluate each demand-side program, to quantify the net savings obtained by substituting the demand-side program for supply resources. In calculating avoided costs of energy that a gas utility would otherwise have had to acquire, reasonable estimates shall be included of financial costs likely to be imposed by future regulations and legislation on emissions of greenhouse gases."⁴

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.

1.1 IL TRC Equation

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

⁴ Illinois Power Agency Act SB1592, pages 7-8.

Equation 1 – Illinois TRC

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

Where,

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

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:

$UAEP_t$	=	Utility avoided energy production costs in year t
$UATD_t$	=	Utility avoided transmission and distribution costs in year t
EB_t	=	Environmental Benefits in year t
$UACat$	=	Utility avoided supply costs for the alternate fuel in year t
$PACat$	=	Participant avoided costs in year t for alternate fuel devices

And costs are defined as:

PRC_t	=	Program Administrator program costs in year t
PIC_t	=	Program Implementation costs in year t
$PEAM_t$	=	Program Evaluation, Measurement & Verification (EM&V), Advertising and Miscellaneous costs in year t
PCN	=	Net Participant costs
UIC_t	=	Utility increased supply costs in year t
d	=	Utility weighted average cost of capital, used as discount rate

1.2 UCT Equation

The results of the Utility Cost Test are also presented in Section 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_{UCT}	=	Benefit-cost ratio of the Utility Cost Test
B_{UCT}	=	Present value of benefits to a utility of a program or portfolio
C_{UCT}	=	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_t , is defined as the program incentives provided by the utility in year t.

1.3 Cost-Effectiveness Data Requirements

The data points needed to conduct the Illinois TRC test are provided in Table 1-1 below and are divided into generic and program specific categories. The program specific data points are further subdivided

into those that are provided by North Shore Gas prior to program implementation versus those that are a result of the Navigant's evaluation activities.

Table 1-1. Data points needed to conduct TRC

Category	Data Point	Source
Generic	• Avoided Gas Production Costs (\$/MCF)	North Shore Gas
	• Avoided Gas Demand Costs (\$/MCF-year)	
	• Discount Rate	
	• Escalation Rates	
	• Environmental Damages	
Program Specific	• Participants / Measure Count	Navigant
	• Verified Ex-Post Energy Savings	
	• Realization Rate	
	• Net to Gross Ratio	
	• Measure life	North Shore Gas / Other
	• Non-Incentive Costs	
	• Utility Incentive Costs	
	• Incremental Costs (Gross)	
	• Incremental Costs (Net)	

Source: Research by Navigant

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.

2. Summary of TRC Results & Generic Data Points

A summary of the portfolio level results, separated by benefits and cost components, is presented in Table 2-1 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 environmental damages in the IL TRC Test.

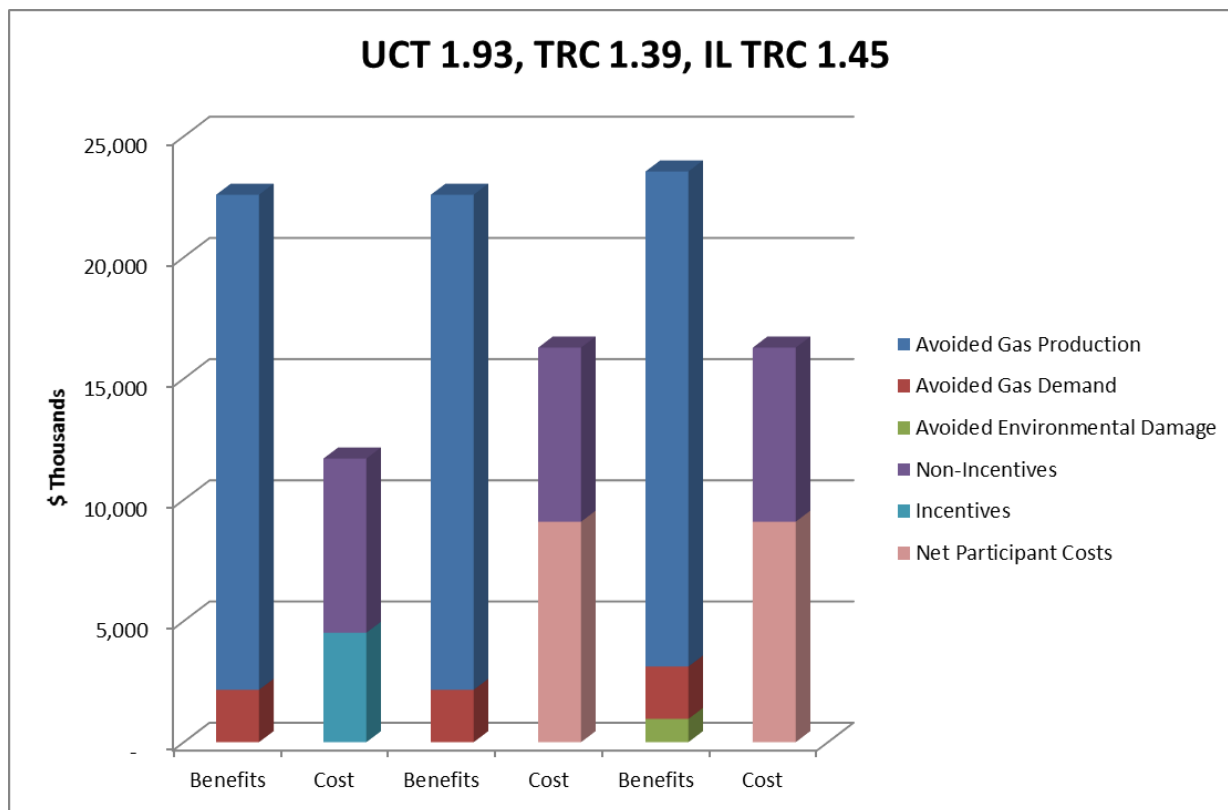
The calculations show the portfolio to be cost effective under all scenarios.

Table 2-1. Summary of Portfolio Level Costs and Benefits (\$ in 000's)

	UCT Test		TRC Test		IL TRC Test	
	Benefits	Cost	Benefits	Cost	Benefits	Cost
Avoided Gas Production	20,423		20,423		20,423	
Avoided Gas Demand	2,161		2,161		2,161	
Avoided Environmental Damage					959	
Non-Incentives		7,184		7,184		7,184
Incentives		4,514				
Net Participant Costs				9,092		9,092
Present Value Totals	22,584	11,699	22,584	16,276	23,543	16,276
Ratio	1.93		1.39		1.45	

Source: Research by Navigant

Figure 1. Summary of Portfolio Level Benefits and Costs



Source: Research by Navigant

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 demand also contribute to overall portfolio benefits. For the comparison to the standard TRC test shown above, the IL TRC includes an additional components for the value of avoided environmental damages.

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 1.93 exceeds both the TRC ratio of 1.39 and the IL TRC ratio of 1.45.

2.1 Generic Data Points

Table 2-2 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 2-2. Summary of Generic Data Points Used for TRC

Data Point	Value
Avoided Gas Production (\$/MCF)	\$0.689 (2013 base year)
Avoided Gas Demand (\$/MCF-year)	\$7.29 (2013 base year)
Discount Rate (Utility WACC %)	8.19%
Avoided Environmental Damages	\$0.034/MCF (2013 base year)
Escalator	2.35% for Avoided Gas Costs 1.83% for Environmental Benefits

Source: Research by Navigant

2.2 Avoided Gas Production Costs (\$/MCF)

Avoided gas production costs are those associated with purchasing natural gas and distributing it to end-use customers. As part of its filed Plan, North Shore Gas calculated natural gas commodity prices at Henry Hub, using the Wood Mackenzie Natural Gas Forecast, Long Term View. North Shore 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.

2.3 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.

2.4 Incentives

Incentives⁵ include financial incentives paid to customers plus incentives paid to third parties. Financial Incentives Paid to Customers means payment⁶ 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.

2.5 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 (e.g., LEDs versus halogens), 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.

⁵ 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.

⁶ 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.

Examples of incremental cost calculations include:

- 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.

2.6 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 8.19% reflects North Shore Gas' weighted average cost of capital (WACC) and is appropriate rate to use for cost-benefit testing.

2.7 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. Since statutory costs effectiveness is measured at the portfolio level, North Shore Gas does not allocate these costs to individual programs.

3. Program Specific Data

3.1 Program Specific Data Summary

A summary of the components of the cost effectiveness calculations for each program are shown in Table 3-1 for the Illinois TRC calculations and Table 3-2 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 3-1. Summary of Program Level Benefits, Costs (\$ in 000's) and IL TRC Test

Program (a)	Benefits				Costs				IL Total Resource Cost (TRC) Test			
	Avoided Gas Production	Avoided Gas Demand	Other Benefits	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)
Residential Prescriptive Rebate	\$ 7,467,562	\$ 790,090	\$ 347,813	Environmental Benefits	\$ 1,030,968	\$ 2,567,764	\$ 8,413,300	\$ 6,551,041	\$ 8,605,465	\$ 7,582,009	\$ 1,023,456	1.13
Multifamily Direct Install	\$ 1,408,782	\$ 149,053	\$ 66,857	Environmental Benefits	\$ 274,720	\$ 329,500	\$ 686,104	\$ 617,494	\$ 1,624,692	\$ 892,214	\$ 732,478	1.82
SF Direct Install	\$ 352,701	\$ 37,317	\$ 16,677	Environmental Benefits	\$ 254,183	\$ -	\$ 106,776	\$ 102,505	\$ 406,695	\$ 356,688	\$ 50,007	1.14
Residential Home Energy Report	\$ 435,635	\$ 46,091	\$ 21,020	Environmental Benefits	\$ 595,259	\$ -	\$ -	\$ -	\$ 502,746	\$ 595,259	\$ (92,513)	0.84
C&I Prescriptive Rebate	\$ 1,417,983	\$ 150,027	\$ 66,721	Environmental Benefits	\$ 302,454	\$ 461,149	\$ 1,628,411	\$ 1,002,068	\$ 1,634,730	\$ 1,304,521	\$ 330,209	1.25
C&I Custom	\$ 6,292,468	\$ 665,762	\$ 294,987	Environmental Benefits	\$ 1,113,404	\$ 743,195	\$ 507,000	\$ 413,010	\$ 7,253,217	\$ 1,526,414	\$ 5,726,803	4.75
C&I Small Business Efficiency	\$ 2,778,552	\$ 293,979	\$ 131,919	Environmental Benefits	\$ 346,351	\$ 276,045	\$ 262,580	\$ 259,954	\$ 3,204,451	\$ 606,306	\$ 2,598,145	5.29
C&I Retro Commissioning	\$ 269,388	\$ 28,502	\$ 12,971	Environmental Benefits	\$ 5,793	\$ 136,829	\$ 143,147	\$ 146,009	\$ 310,861	\$ 151,802	\$ 159,059	2.05
Sum of programs	\$ 20,423,070	\$ 2,160,822	\$ 958,965		\$ 3,923,132	\$ 4,514,482	\$ 11,747,318	\$ 9,092,081	\$ 23,542,857	\$ 13,015,213	\$ 10,527,644	1.81
Portfolio Costs					\$ 3,261,141					\$ 3,261,141	\$ (3,261,141)	
Aggregate Portfolio	\$ 20,423,070	\$ 2,160,822	\$ 958,965		\$ 7,184,273	\$ 4,514,482	\$ 11,747,318	\$ 9,092,081	\$ 23,542,857	\$ 16,276,354	\$ 7,266,503	1.45

Source: Navigant Analysis

Table 3-2. Summary of Program Level Benefits, Costs (\$ in 000's) and Utility Cost Test

Program (a)	Benefits				Costs				Utility Cost Test (UCT)			
	Avoided Energy Production	Avoided Gas Demand	Other Benefits	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)
Residential Prescriptive Rebate	\$ 7,467,562	\$ 790,090	\$ 347,813	Environmental Benefits	\$ 1,030,968	\$ 2,567,764	\$ 8,413,300	\$ 6,551,041	\$ 8,257,652	\$ 3,598,732	\$ 4,658,920	2.29
Multifamily Direct Install	\$ 1,408,782	\$ 149,053	\$ 66,857	Environmental Benefits	\$ 274,720	\$ 329,500	\$ 686,104	\$ 617,494	\$ 1,557,835	\$ 604,220	\$ 953,615	2.58
SF Direct Install	\$ 352,701	\$ 37,317	\$ 16,677	Environmental Benefits	\$ 254,183	\$ -	\$ 106,776	\$ 102,505	\$ 390,018	\$ 254,183	\$ 135,835	1.53
Residential Home Energy Report	\$ 435,635	\$ 46,091	\$ 21,020	Environmental Benefits	\$ 595,259	\$ -	\$ -	\$ -	\$ 481,726	\$ 595,259	\$ (113,533)	0.81
C&I Prescriptive Rebate	\$ 1,417,983	\$ 150,027	\$ 66,721	Environmental Benefits	\$ 302,454	\$ 461,149	\$ 1,628,411	\$ 1,002,068	\$ 1,568,009	\$ 763,603	\$ 804,407	2.05
C&I Custom	\$ 6,292,468	\$ 665,762	\$ 294,987	Environmental Benefits	\$ 1,113,404	\$ 743,195	\$ 507,000	\$ 413,010	\$ 6,958,230	\$ 1,856,599	\$ 5,101,632	3.75
C&I Small Business Efficiency	\$ 2,778,552	\$ 293,979	\$ 131,919	Environmental Benefits	\$ 346,351	\$ 276,045	\$ 262,580	\$ 259,954	\$ 3,072,531	\$ 622,396	\$ 2,450,135	4.94
C&I Retro Commissioning	\$ 269,388	\$ 28,502	\$ 12,971	Environmental Benefits	\$ 5,793	\$ 136,829	\$ 143,147	\$ 146,009	\$ 297,890	\$ 142,622	\$ 155,268	2.09
Sum of programs	\$ 20,423,070	\$ 2,160,822	\$ 958,965		\$ 3,923,132	\$ 4,514,482	\$ 11,747,318	\$ 9,092,081	\$ 22,583,892	\$ 8,437,614	\$ 14,146,278	2.68
Portfolio Costs					\$ 3,261,141					\$ 3,261,141	\$ (3,261,141)	
Aggregate Portfolio	\$ 20,423,070	\$ 2,160,822	\$ 958,965		\$ 7,184,273	\$ 4,514,482	\$ 11,747,318	\$ 9,092,081	\$ 22,583,892	\$ 11,698,755	\$ 10,885,137	1.93

Source: Navigant Analysis

A summary of the components of the verified savings and costs for each program are shown in Table 3-3 through Table 3-5 for each program year. The tables include the component values for each program, as well as portfolio level totals for each component.

Table 3-3. Summary of Verified Savings and Program Costs for GPY1

	Realization Rate	Verified Ex Post Gross		Deemed/Used	Verified Ex Post Net				Actual	Participation		Weighted Average Measure Life
	Energy Savings (Ex Ante Gross/Ex Post Gross)	First Year Annual Energy Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	# Units	Units Definition	Years
	%	Therms	Therms	%	Therms	Therms	\$/Therms	\$/Therms	\$			
Residential Programs												
Residential Prescriptive Rebate	100%	156,705	3,134,100	67%	104,992	2,099,840	\$ 3.15	\$ 0.16	\$ 330,602	991	Measures / Units	20.0
Multifamily Direct Install	100%	88,076	831,873	90%	79,254	748,550	\$ 1.43	\$ 0.15	\$ 113,458	8,942	Measures / Units	9.4
Total Residential		244,781	3,784,244	75%	184,246	2,848,390	\$ 2.41	\$ 0.16	\$ 444,060	9,933		15.5
Business Programs												
C&I Prescriptive Rebate	100%	98,905	1,158,407	43%	42,542	498,265	\$ 3.95	\$ 0.34	\$ 168,198	96	Measures / Units	11.7
C&I Custom	102%	39,670	595,050	68%	26,975	404,625	\$ 3.21	\$ 0.21	\$ 86,529	3	Projects	15.0
Retro Commissioning	120%	67,908	339,540	102%	68,927	344,635	\$ 1.16	\$ 0.23	\$ 79,786	1	Projects	5.0
Small Business Energy Savings	99%	43,955	375,551	99%	43,515	371,792	\$ 1.21	\$ 0.14	\$ 52,581	631	Measures	8.5
Total Business		250,438	2,228,735	73%	181,959	1,619,317	\$ 2.13	\$ 0.24	\$ 387,093	731		8.9
Portfolio Total		495,219	6,012,979	74%	366,205	4,467,707	\$ 2.58	\$ 0.21	\$ 946,250	10,664		12.2

Source: Navigant Analysis

Table 3-4. Summary of Verified Savings and Program Costs for GPY2

	Realization Rate	Verified Ex Post Gross		Deemed/Used	Verified Ex Post Net				Actual	Participation		Weighted Average Measure Life
	Energy Savings (Ex Ante Gross/Ex Post Gross)	First Year Annual Energy Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	# Units	Units Definition	Years
	%	Therms	Therms	%	Therms	Therms	\$/Therms	\$/Therms	\$			
Residential Programs												
Residential Prescriptive Rebate	102%	330,612	6,451,887	80%	264,489	5,161,498	\$ 3.70	\$ 0.19	\$ 978,616	151,230	Measures / Units	19.5
Single Family Direct Install	89%	21,858	224,963	96%	20,984	215,968	\$ 2.60	\$ 0.25	\$ 54,550	6,727	Measures / Units	10.3
Multifamily Direct Install	98%	154,640	1,060,569	90%	139,176	954,512	\$ 1.77	\$ 0.26	\$ 246,114	11,727	Measures / Units	6.9
Total Residential		507,110	7,561,561	84%	424,649	6,331,978	\$ 3.01	\$ 0.20	\$ 1,279,280	169,684		14.9
Business Programs												
C&I Prescriptive Rebate	100%	207,059	2,188,367	63%	130,447	1,378,669	\$ 3.02	\$ 0.29	\$ 394,147	142,939	Measures / Units	10.6
C&I Custom	81%	249,179	3,737,685	78%	194,360	2,915,400	\$ 2.45	\$ 0.16	\$ 476,132	10	Projects	15.0
Small Business Energy Savings	102%	261,732	1,633,798	99%	259,115	1,617,462	\$ 0.72	\$ 0.12	\$ 187,190	882	Measures	6.2
Total Business		717,970	7,268,612	81%	583,922	5,911,532	\$ 1.81	\$ 0.18	\$ 1,057,469	143,831		10.1
Portfolio Total		1,225,080	14,830,173	82%	1,008,571	12,243,510	\$ 3.48	\$ 0.29	\$ 3,511,338	313,515		12.1

Source: Navigant Analysis

Table 3-5. Summary of Verified Savings and Program Costs for GPY3

	Realization Rate	Verified Ex Post Gross		Deemed/Used	Verified Ex Post Net				Actual	Participation		Weighted Average Measure Life
	Energy Savings (Ex Ante Gross/Ex Post Gross)	First Year Annual Energy Savings	Lifetime Savings	Net-to-Gross Ratio	First Year Annual Savings	Lifetime Savings	First Year Cost per First Year Annual Savings	First Year Cost per Lifetime Savings	Program Costs	# Units	Units Definition	Years
	%	Therms	Therms	%	Therms	Therms	\$/Therms	\$/Therms	\$			
Residential Programs												
Residential Prescriptive Rebate	100%	720,068	13,484,220	80%	576,055	10,787,387	\$ 3.97	\$ 0.21	\$ 2,289,514	202,129	Measures / Units	18.7
Single Family Direct Install	98%	49,772	509,515	96%	47,781	489,133	\$ 4.07	\$ 0.40	\$ 194,331	8,413	Measures / Units	10.2
Home Energy Reports	N/A	652,718	652,718	100%	652,718	652,718	\$ 0.91	\$ 0.91	\$ 595,241	91,350	Reports	1.0
Multifamily Direct Install	100%	100,335	1,186,946	90%	90,301	1,068,246	\$ 2.71	\$ 0.23	\$ 244,648	18,148	Measures / Units	11.8
Total Residential		1,522,893	14,481,256	90%	1,366,855	12,997,484	\$ 2.43	\$ 0.26	\$ 3,323,734	320,040		9.5
Business Programs												
C&I Prescriptive Rebate	100%	140,671	1,972,956	63%	88,623	1,242,966	\$ 2.27	\$ 0.16	\$ 201,258	139,985	Measures / Units	14.0
C&I Custom	99%	734,951	11,024,265	93%	685,751	10,286,265	\$ 1.89	\$ 0.13	\$ 1,293,938	13	Projects	15.0
Retro Commissioning	100%	23,123	115,615	102%	23,585	117,925	\$ 1.88	\$ 0.38	\$ 44,319	2	Projects	5.0
Small Business Energy Savings	102%	352,976	3,301,122	99%	349,446	3,268,108	\$ 1.09	\$ 0.12	\$ 382,625	18,078	Measures	9.4
Total Business		1,251,721	16,271,281	92%	1,147,405	14,915,264	\$ 1.68	\$ 0.13	\$ 1,922,140	158,078		13.0
Portfolio Total		2,774,614	30,752,538	91%	2,514,260	27,912,748	\$ 2.88	\$ 0.26	\$ 7,241,167	478,118		11.1

Source: Navigant Analysis

3.2 Program Specific Data Review

With respect to the program specific data used in TRC calculation, several were based on North Shore 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 admin costs were provided by North Shore Gas' energy efficiency staff. It is worth noting that many of the programs were jointly implemented by North Shore Gas and Commonwealth Edison. These programs include Residential Prescriptive Rebate, Multifamily Direct Install, Single Family Direct Install, C&I Retro-Commissioning, and C&I Small Business Efficiency. In these cases, the utility costs were split between the utilities based on an agreed percentage.

The remaining data points that were provided by North Shore Gas in the TRC evaluation were the Measure Life and Incremental Costs. These values were confirmed or revised by Navigant based upon deemed values in the Illinois TRM Version 2.0, where appropriate. 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.

3.3 Residential Prescriptive Rebate

In the Residential Prescriptive Rebate program, North Shore Gas offers high-efficiency furnace rebates in conjunction with Commonwealth Edison Company (ComEd) that offers cash incentives and education to encourage upgrading central air-conditioning systems. The dollar amount of the rebate depends on the size and efficiency of the replacement measures. Both rental and owner-occupied dwellings are eligible for rebates for furnaces and air-conditioning systems. In order to receive these rebates, customers must be active residential customers of North Shore Gas and ComEd, and they must use premises in existing buildings for residential purposes.

Table 3-6. IL TRC Components for Residential Prescriptive Rebate Program

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	1,207,385
Ex-Post Net Savings (Therms) @ the Meter	945,536
Utility Non-Incentive Costs	\$1,030,968
Utility Incentive Costs	\$2,567,764
Gross Incremental Costs	\$8,413,300
Net Incremental Costs	\$6,551,041
Total TRC Benefits	\$8,605,465
Total TRC Costs – summary	\$7,582,009
Total TRC Net Benefits	\$1,023,456
TRC Test Ratio	1.13

Source: Research by Navigant

3.2.1 Measure Life

A range of measure lives were used for the Residential Prescriptive Rebate 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.⁷

Table 3-7. Measure life of the Residential Prescriptive Rebate Program Measures

Measure	Measure Life (in years)
Furnace Tune-up	3
Boiler Tune-up	5
Duct Sealing	5
Programmable Thermostats	9
Storage Water Heater	15
Attic Insulation	20
Boiler	20
Boiler Reset Controls	20
Furnace	20
Pipe Insulation	20
Indirect Storage Water Heater	20
Tankless Water Heater	20

Source: Research by Navigant

3.3.1 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 or other resources where appropriate, such as program records. The table below summarizes the incremental cost used for the Residential Prescriptive Rebate program measures.

⁷ Illinois Statewide Technical Reference Manual for Energy Efficiency, Version 2.0. Effective June 1, 2013.

Table 3-8. Incremental Cost of the of the Residential Prescriptive Rebate Program Measures

Measure	Incremental cost per unit (in \$)
Boiler Tune-up	650
Duct Sealing	3
Programmable Thermostats	75
Storage Water Heater	400
Attic Insulation	1
Boiler (<=300 MBtu)	1,250 - 1,994 per unit
Boiler Reset Controls	200
Furnace	802 - 1,438
Furnace Tune-up	1,650
Pipe Insulation	3
Indirect Storage Water Heater	400
Tankless Water Heater	1,050

Source: Research by Navigant

3.3.2 Impact Results

Table 3-9 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-9. Residential Prescriptive Rebate Incentive GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	156,705	330,612	720,068	1,207,385
Verified Net	104,992	264,489	576,055	945,536
NTG Ratio	0.67	0.80	0.80	0.78

Source: Research by Navigant

3.4 Single Family Direct Install

The Single Family Direct Install program is an assessment and direct install program jointly implemented by the Commonwealth Edison Company (ComEd) and North Shore Gas with Franklin Energy Services implementing the program. The main goal of this residential direct install program is to secure energy savings through direct installation of low-cost efficiency measures, such as water efficient showerheads and faucet aerators, pipe insulation, and programmable thermostats at eligible single family residences. A second objective of this program is to perform a brief assessment of major retrofit opportunities (e.g., furnace, boiler, air conditioning, insulation, and air sealing) and bring heightened awareness to the homeowners about available additional efficiency programs offered by ComEd and North Shore Gas.

Table 3-10. IL TRC Components for Single Family Direct Install

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	71,630
Ex-Post Net Savings (Therms) @ the Meter	68,765
Utility Non-Incentive Costs	\$254,183
Utility Incentive Costs	\$0
Gross Incremental Costs	\$106,776
Net Incremental Costs	\$102,505
Total TRC Benefits	\$406,695
Total TRC Costs – summary	\$356,688
Total TRC Net Benefits	\$50,007
TRC Test Ratio	1.14

Source: Research by Navigant

3.4.1 Measure Life

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

Table 3-11. Measure life of the Single Family Direct Install Program Measures

Measure	Measure Life (in years)
Bathroom Aerator	5
Programmable Thermostat	9
Showerhead	10
Kitchen Aerator	10
DHW Pipe Wrap	13
Boiler Pipe Wrap	13
Pipe Insulation	20

Source: Research by Navigant

3.4.2 Participant/Incremental Costs

The table below summarizes the incremental cost used for the Single Family Direct Install program measures.

Table 3-12. Incremental Cost of the of the Single Family Direct Install Measures

Measure	Incremental cost per unit (in \$)
Bathroom Aerator	8
Programmable Thermostat	75
Showerhead	12
Kitchen Aerator	8
Showerhead	12
DHW Pipe Wrap	3
Boiler Pipe Wrap	3
Pipe Insulation	3

Source: Research by Navigant

3.4.3 Impact Results

Table 3-13 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-13. Single Family Direct Install GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	NA	21,858	49,772	71,630
Verified Net	NA	20,984	47,781	68,765
NTG Ratio	NA	0.96	0.96	0.96

Source: Research by Navigant

3.5 Multi-Family Direct Install

The Multi-Family Direct Install program achieves natural gas energy savings for customers of North Shore 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 Direct Install 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, Multi-Family Direct Install 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 Direct Install program was delivered through three channels: direct install, trade ally installation, and prescriptive incentives.

Table 3-14. IL TRC Components for Multi-Family Direct Install GPY1-GPY3

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	343,051
Ex-Post Net Savings (Therms) @ the Meter	308,731
Utility Non-Incentive Costs	\$274,720
Utility Incentive Costs	\$329,500
Gross Incremental Costs	\$686,104
Net Incremental Costs	\$617,494
Total TRC Benefits	\$1,624,692
Total TRC Costs – summary	\$892,214
Total TRC Net Benefits	\$732,478
TRC Test Ratio	1.82

Source: Research by Navigant

3.5.1 Measure Life

A range of measure lives were used for the Multi-Family Direct Install 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 3-15. Measure life of the Multi-Family Direct Install Measures

Measure	Measure Life (in years)
Programmable Thermostat Setback	3
Furnace Tune-up	5
Boiler Tune-up	5
Bathroom Aerator	5
Programmable Thermostats	9
Kitchen Aerators	10
Showerhead	10
HW Pipe Wrap	13
Large Gas Water Heater	15
Pipe Insulation	20
High Efficiency Furnace	20
High Efficiency Boiler	20

Source: Research by Navigant

3.5.2 Participant/Incremental Costs

The table below summarizes the incremental cost used for the Multi-Family Direct Install program measures.

Table 3-16. Incremental Cost of the of the Multi-Family Direct Install Measures

Measure	Incremental cost per unit (in \$)
Programmable Thermostat Setback	5
Boiler Tune-up	2 per MBtu
Furnace Tune-up	1,650
Bathroom Aerator	8
Programmable Thermostats	75
Kitchen Aerators	8
Showerhead	12
HW Pipe Wrap	3
Large Gas Water Heater	1
Pipe Insulation	3
High Efficiency Furnace	1,511
High Efficiency Boiler	10

Source: Research by Navigant

3.5.3 Impact Results

Table 3-17 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-17. Multi-Family Direct Install Program GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	88,076	154,640	100,335	343,051
Verified Net	79,254	139,176	90,301	308,731
NTG Ratio	0.90	0.90	0.90	0.90

Source: Research by Navigant

3.6 Residential Home Energy Report

The Home Energy Report (HER) Program is designed to generate gas savings by providing residential customers with sets of information about their specific gas use and related conservation suggestions and tips. The information is provided in the form of Home Energy 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. Currently, participating households receive the reports monthly. 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.

Table 3-18. IL TRC Components for Residential Home Energy Report program

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	652,718
Ex-Post Net Savings (Therms) @ the Meter	652,718
Utility Non-Incentive Costs	\$595,259
Utility Incentive Costs	\$0
Gross Incremental Costs	\$0
Net Incremental Costs	\$0
Total TRC Benefits	\$502,746
Total TRC Costs – summary	\$595,259
Total TRC Net Benefits	-\$92,513
TRC Test Ratio	0.84

Source: Research by Navigant

3.6.1 Measure Life

A measure life of one year was assumed for the Residential Home Energy Report 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 is conservative. In future TRC evaluations, this assumption will be updated to incorporate the results of the persistence study.

3.6.2 Participant/Incremental Costs

The incremental cost is assumed to be zero.

3.6.3 Impact Results

Table 3-19 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-19. Residential Home Energy Report GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	N/A	N/A	652,718	652,718
Verified Net	N/A	N/A	652,718	652,718
NTG Ratio	N/A	N/A	1.0	1.0

Source: Research by Navigant

3.7 C&I Prescriptive Rebate

The Commercial & Industrial (C&I) Prescriptive Rebate program (C&I Prescriptive program) is targeted to all C&I customers. The C&I Prescriptive program provides rebates to customers to install, replace or retrofit qualifying equipment. While the actual list of equipment may vary over time, the

program generally includes measures such as natural gas heating systems, control technologies, water heating equipment, and food service equipment. The C&I Prescriptive program is targeted to active customers of North Shore Gas. In general these customers are served under rates S.C. No. 2 and S.C. No. 3.

Customer rebates are based on a portion of the incremental cost difference between standard or minimum code efficiency and high efficiency equipment that varies by measure. If the common industry practice is to replace equipment with higher efficiency than the standard- or minimum code-required efficiency, the higher efficiency number is used as a baseline from which to calculate the rebate and energy savings. Customers may receive a rebate without pre-approval for participation. The C&I Prescriptive program relies on wholesale and retail trade allies to assist in the marketing of this program. Trade ally support and engagement is considered to be a key element to the success of this program. The C&I Prescriptive program may provide incentives to trade allies for specific, limited-time promotions.

Table 3-20. IL TRC Components for C&I Prescriptive Rebate Program

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	446,635
Ex-Post Net Savings (Therms) @ the Meter	261,612
Utility Non-Incentive Costs	\$302,454
Utility Incentive Costs	\$461,149
Gross Incremental Costs	\$1,628,411
Net Incremental Costs	\$1,002,068
Total TRC Benefits	\$1,634,730
Total TRC Costs – summary	\$1,304,521
Total TRC Net Benefits	\$330,209
TRC Test Ratio	1.25

Source: Research by Navigant

3.7.1 Measure Life

The C&I Prescriptive Rebate program included different measure groups and therefore a 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 3-21. Measure life of the C&I Prescriptive Rebate Program Measures

Measure	Measure Life (in years)
Boiler Tune-up	5
Bathroom Aerator	5
Pre-Rinse Sprayer	5
Steam Trap	6
Programmable Thermostat	9
Showerhead	10
Infrared Upright Broiler	10
Energy Star Convection Oven	12
Energy Star Convection Oven	12
Infrared Salamander Broiler	12
Infrared Charbroiler	12
Pasta Cooker	12
Food Service Appliances	12
Energy Star Fryer	15
Gas Water Heater	15
Infrared Heater	15
Linkageless Controls	16
Industrial Burner Turndown	16
Boiler	20 - 30
Boiler Reset Control	20
Furnace	20
Indirect Water Heater	20
Pipe Insulation	20
Unit Heater Condensing	25

Source: Research by Navigant

3.7.2 Participant/Incremental Costs

The table below summarizes the incremental costs used for the C&I Prescriptive Rebate program measures.

Table 3-22. Incremental Cost of the of the C&I Prescriptive Rebate Program Measures

Measure	Incremental cost (in \$)
Boiler Tune-up	2 per MBH or 650 per unit
Bathroom Aerator	8
Pre-Rinse Sprayer	60
Steam Trap	77
Programmable Thermostat	75
Infrared Upright Broiler	5,900
Showerhead	12
Energy Star Convection Oven	1,900
Infrared Salamander Broiler	1,000
Infrared Charbroiler	2,200
Pasta Cooker	2,400
Food Service Appliances	800
Energy Star Fryer	1,200
Gas Water Heater (0.67 EF)	400 per unit
Gas Water Heater (0.82 EF)	1 per MBH
Infrared Heater	5
Linkageless Controls	3
Boiler	25 per MBH or 2,570 – 9750 per unit
Boiler Reset Control	2 – 200
Furnace	630 – 1,511
Indirect Water Heater	1,500
Pipe Insulation	3
Industrial Burner Turndown	1
Unit Heater Condensing	700

Source: Research by Navigant

3.7.3 Impact Results

Table 3-23 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-23. C&I Prescriptive Rebate Program GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	98,905	207,059	140,671	446,635
Verified Net	42,542	130,447	88,623	261,612
NTG Ratio	0.43	0.63	0.63	0.59

Source: Research by Navigant

3.8 C&I Custom

The C&I Custom program provides C&I customers with financial incentives for the installation of natural gas-related energy efficiency improvements that are not specified for a prescriptive rebate under the C&I Prescriptive Rebate program. The C&I Custom program is targeted to active customers of North Shore Gas. These customers are served under rates S.C. No. 2 and S.C. No. 3.

The C&I Custom program provides a mechanism for a range of customers in various market sectors to install a wide variety of natural gas savings technologies. Typical market sectors for this program include larger customers in light and heavy manufacturing, steel and metal working, plastics compounding and processing, hospitals, food processing, hotels, commercial laundry and other process heating intensive businesses. Large centrally-heated buildings are also target sectors for this program. Eligible projects receive calculated incentives aimed at improving the financial viability of the energy efficiency improvements. In GPY3, C&I Custom rebates were offered for Custom Gas Optimization projects. Custom rebates are individually determined and analyzed using the Companies' benefit-cost model to ensure that they pass the TRC test. Any measure that is pre-qualified (assessed for cost-effectiveness prior to being installed) must produce a TRC test result of under 1.0, as the program is expected to produce an overall TRC of 1.0. To enable as many customers as possible to participate in any one year, the program caps each customer's total maximum rebate at \$500,000 per customer per program year.⁸ The program may waive the maximum rebate limitation based on projects in the program's queue.

Table 3-24. IL TRC Components for C&I Custom Program

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	1,023,800
Ex-Post Net Savings (Therms) @ the Meter	907,086
Utility Non-Incentive Costs	\$1,113,404
Utility Incentive Costs	\$743,195
Gross Incremental Costs	\$507,000
Net Incremental Costs	\$413,010
Total TRC Benefits	\$7,253,217
Total TRC Costs – summary	\$1,526,414
Total TRC Net Benefits	\$5,726,803
TRC Test Ratio	4.75

Source: Research by Navigant

3.8.1 Measure Life

There were a number of measures included in the C&I Custom program. The measure life is assumed to be 15 years for the TRC calculation. The program involves a variety of measures with a range of measure lives. In general, the savings from the program were dominated by longer lasting measures, such as HVAC replacements, boiler replacements, and control systems. Most of the measures have

⁸ Based on one of the following calculations: (i) \$1.00 per therm saved in the first year; (ii) buy down to one-year payback; (iii) full incremental project cost or 50% of total project cost (source: *Integritys EEP Operating Plan*).

longer measure lives of 15-20 years. As such, 15 years is a reasonable average to use based on weighted average savings.

3.8.2 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 is around \$19,500.

3.8.3 Impact Results

Table 3-25 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-25. C&I Custom GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	39,670	249,179	734,951	1,023,800
Verified Net	26,975	194,360	685,751	907,086
NTG Ratio	0.68	0.78	0.93	0.89

Source: Research by Navigant

3.9 C&I Retro-Commissioning

The C&I Retro-Commissioning program has been offered each of the three gas program years. The program was offered as a joint utility program with the North Shore Gas where service areas overlap ComEd's. 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 power 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 3-26. IL TRC Components for C&I Retro-Commissioning Program

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	91,031
Ex-Post Net Savings (Therms) @ the Meter	92,512
Utility Non-Incentive Costs	\$5,793
Utility Incentive Costs	\$136,829
Gross Incremental Costs	\$143,147
Net Incremental Costs	\$146,009
Total TRC Benefits	\$310,861
Total TRC Costs – summary	\$151,802
Total TRC Net Benefits	\$159,059
TRC Test Ratio	2.05

Source: Research by Navigant

3.9.1 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,⁹ both of which are key components of the Retro-Commissioning program. Navigant used a 5 year measure life for this program to be consistent with the value utilized for the cost-effectiveness calculations for ComEd for the Retro-Commissioning program.

3.9.2 Participant/Incremental Costs

Incremental measure cost was determined during the EM&V process and is approximately \$3,000. For this program, the costs of studies and assessments are included within the total net incremental costs for the incentivized projects.

3.9.3 Impact Results

Table 3-27 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-27. C&I Retro-Commissioning GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	67,908	0	23,123	91,031
Verified Net	68,927	0	23,585	92,512
NTG Ratio	1.02	NA	1.02	1.02

Source: Research by Navigant

⁹ "RCx Project Submittal Guidelines." Pacific Gas and Electric Company. November 2010.

3.10 C&I Small Business Efficiency

The C&I Small Business Efficiency program is designed to assist qualified North Shore Gas non-residential customers to achieve gas energy savings by educating them about energy efficiency opportunities through on-site assessments conducted by trade allies and installation of no-cost direct-install natural gas energy efficiency measures. Further savings are available to participating customers through incentives of 30 to 75 percent offered for select contractor-installed natural gas efficient measures.

Table 3-28. IL TRC Components for C&I Small Business Efficiency

Item	Value
Ex-Post Gross Savings (Therms) @ the Meter	658,663
Ex-Post Net Savings (Therms) @ the Meter	652,076
Utility Non-Incentive Costs	\$346,351
Utility Incentive Costs	\$276,045
Gross Incremental Costs	\$262,580
Net Incremental Costs	\$259,954
Total TRC Benefits	\$3,204,451
Total TRC Costs – summary	\$606,306
Total TRC Net Benefits	\$2,598,145
TRC Test Ratio	5.29

Source: Research by Navigant

3.10.1 Measure Life

The C&I Small Business Efficiency 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.

Table 3-29. Measure life of the C&I Small Business Efficiency

Measure	Measure Life (in years)
Furnace Tune-up	2
Bathroom Aerators	5
Pre-rinse sprayer	5
Steam-trap	6
Programmable Thermostat	9
Showerhead	10
Convection Oven	12
Single-Pipe Steam Boiler Averaging Controls	16
Pipe Insulation	20
Furnace	20

Source: Research by Navigant

3.10.2 Participant/Incremental Costs

The table below summarizes the incremental cost used for the C&I Small Business Efficiency program measures.

Table 3-30. Incremental Cost of the of the C&I Small Business Efficiency

Measure	Incremental cost per unit (in \$)
Furnace Tune-up	1,650
Bathroom Aerators	8
Pre-rinse sprayer	60
Steam-trap	77
Programmable Thermostat	75
Showerhead	12
Convection Oven	1,900
Single-Pipe Steam Boiler Averaging Controls	612
Pipe Insulation	3
Furnace	802

Source: Research by Navigant

3.10.3 Impact Results

Table 3-31 shows the key results of the gross and net impact evaluation using deemed savings estimates.

Table 3-31. C&I Small Business Efficiency GPY1-GPY3 Impact Results

	GPY1 Therm Savings	GPY2 Therm Savings	GPY3 Therm Savings	GPY1-GPY3 Therm Savings
Verified Gross	43,955	261,732	352,976	658,663
Verified Net	43,515	259,115	349,446	652,076
NTG Ratio	0.99	0.99	0.99	0.99

Source: Research by Navigant